Data General

Technical Manual

FIELD SERVICE MAINTENANCE PROCEDURES

6040-6043 DATA TERMINALS

10, 15, 30, 60 CPS

015-000052-01

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6040-6043 DATA TERMINALS

10, 15, 30, 60 CPS

INTRODUCTION I

ADJUSTMENT PROCEDURES II

REPLACEMENT PROCEDURES III

APPENDICES

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SECTION I

INTRODUCTION

Data General Corporation (DGC) has prepared this manual for use by DGC personnel and customers as a guide to the proper installation, operation, and maintenance of DGC equipment and software. The drawings and specifications contained herein are the property of DGC and shall neither be reproduced in whole or in part without DGC's prior written approval nor be implied to grant any license to make, use, or sell equipment manufactured in accordance herewith.

INTRODUCTION

This manual describes field service procedures to adjust and repair Data General's Data Terminals, Models 6040 through 6043. It is intended for use by authorized field service personnel only, and presumes a basic understanding of the theory of operation and operating procedures for the terminal, as presented in the Data General Technical Manual, ordering no. 015-000051.

There are two major sections to this manual. The first describes procedures required to adjust the various systems of the terminal, while the second describes procedures necessary to replace components on the terminal. Two appendices are included: Appendix A contains a summary of mechanical and electrical specifications which are relevant to repairing the unit, while Appendix B is a compendium of important waveforms and their locations on the current revision of the logic board and power supply.

Each procedure consists of three sections: an abstract of the procedure, including the problem which the procedure should cure, a list of special tools required, and a description of the procedure itself. It is assumed that field service personnel are equipped with a standard tool kit.

The technical manual for the terminal summarizes the documentation available for the terminal, including schematic drawings and electrical and mechanical Ilustrated Parts Lists (IPL's). Consult these documents as necessary when repairing a particular unit, to ensure that all descriptions are commensurate with the particular unit. The mechanical IPL's should be consulted for all repair procedures, and are particularly useful when reassembling the data terminal, to ensure that the various parts are installed in the correct order.

An interconnection diagram is available, which specifies all cabling connections within the data terminal. Plug numbers, pin numbers, color coding, and source and destination for all cables are included on this drawing.

NOTE *All mechanical parts must be clean and free of lint and dust. Use a lint-free tissue and isopropyl alcohol to clean all parts before installing them; remove any preservative from replacement parts. Do NOT lubricate any parts when servicing this terminal -- lubricants tend to accumulate dust and dirt, which will seriously degrade performance. The terminal is designed to provide long service without lubrication.*

CAUTION *The print mechanism frame consists of two endplates and two cross members. NEVER loosen or disassemble the frame, as this will misalign these pieces, causing the printhead to bind during its travel. The frame must be reassembled using a precision fixture to ensure accurate alignment of the endplates and cross members. This fixture is not available in the field, and the frame must be returned to the factory if these pieces are disturbed.*

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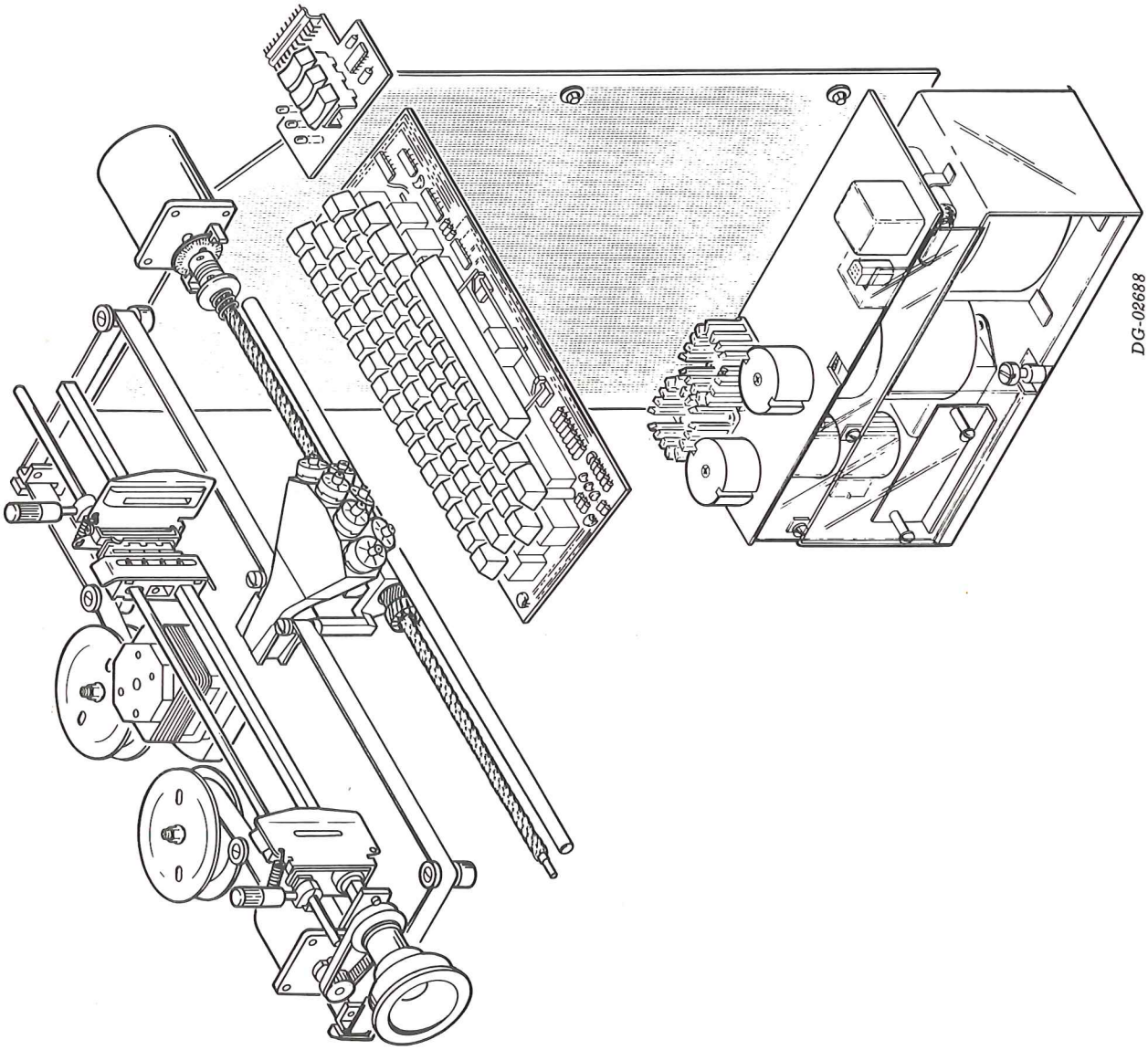

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SECTION II

ADJUSTMENT PROCEDURES

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ADJUSTING THE TIMING AND HOME FLAG TRANSDUCERS

Three photoelectric transducers are used to control the printhead motion during a print sequence, and to position the printhead at the left margin at the completion of a carriage return operation. Two of these transducers, the print timing transducer and the return speed transducer, are located at the timing disc, and these signals are generated by the two sets of radial slots on the disc. The front transducer is the print timing transducer, and the rear one is the return speed transducer. The third transducer, the home flag transducer, is located on the bottom of the printhead; its signals are generated by a home flag bracket which is fastened to the outer guide rail at the left-hand side of the mechanism.

When these transducers are out of adjustment, character spacing is uneven and/or registration at the left margin is ragged. In some case, the print may be illegible due to extremely uneven character spacing. One, two or all three transducers may require adjustment, but rather than isolating and adjusting one, the following procedure assumes that all are out of adjustment and presents a systematic method to adjust all three.

These transducers are adjusted, after an initial mechanical setup, while observing the relationships of certain timing signals generated on the logic board. Adjustment consists of moving the transducers to bring these relationships to specified values. (The home flag transducer is not actually moved; the bracket is moved to adjust this signal.)

Special Tools Required

Dual-trace Oscilloscope
Torque Wrench, 10 in.-lb. calibration
Six-inch machinist's rule (or equivalent)
"L" shaped hex wrench, 7/64"

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Procedure

1. Switch the terminal to OFF LINE, and ensure that the baud rate is set to 300 baud (30 cps).

   6040/6041: set BAUD RATE switch to 300, remove jumper W5, insert jumper W6.
   6042/6043: set BAUD RATE switch to 300.

   Remove the logic board cover.

2. Set up the oscilloscope to display the return speed transducer signal, triggering on the rising edge of MOTOR PULSE. These signals are available as noted on the right, for the artwork revision level specified. Observe the traces as the printhead is moving at 30 cps; depress RPT and (for example) the space bar for this operation. The traces should appear as shown in the figure.

3. If the gap is not correct, move the return speed (rear) transducer slightly and recheck the signals. Loosen the clamping screw using the "L" shaped hex wrench, move the transducer, and tighten the screw before operating the unit and observing the signals. Repeat this cycle until the traces agree with the figure.

   When the oscilloscope traces are correct, tighten the transducer clamping screw securely and recheck the traces.

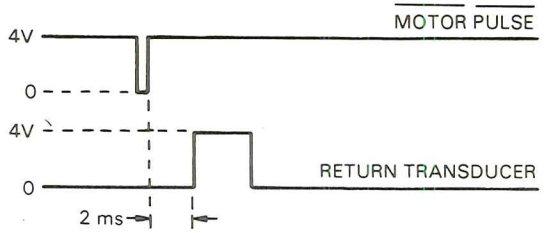
RETURN SPEED TRANSDUCER:

TP5 OR (U105-13)
REV -01
U95-13 REV -00

$\overline{\text{TRIGGER}}$ $\overline{\text{MOTOR PULSE}}$:

TP2 OR U98-11
REV -01

U98-11 REV -00



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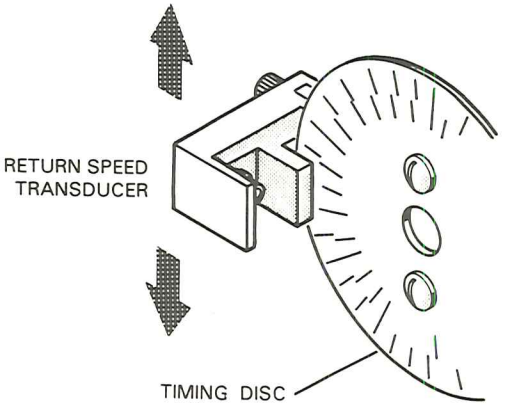
NOTE *The 2 ms. gap, between MOTOR PULSE and the rising edge of the first transducer pulse, is the most critical figure.*



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4. Set the right-hand end of the home flag bracket as shown (3 1/16 inch from end of bracket). This is the adjustment for the home flag transducer--the transducer itself, which is mounted on the carriage, is not moved. If the bracket is too close to the frame, loosen the bracket's clamping screw, loosen the locknut on the adjusting screw, and turn the adjusting screw to push the bracket to the specified position. If the bracket is too far from the frame, loosen the clamping screw, back off the adjusting screw and push the bracket toward the frame until it is bottomed on the adjusting screw. Then turn the adjusting screw to push the bracket to the specified position. Tighten the bracket clamping screw and the locknut on the adjusting screw.

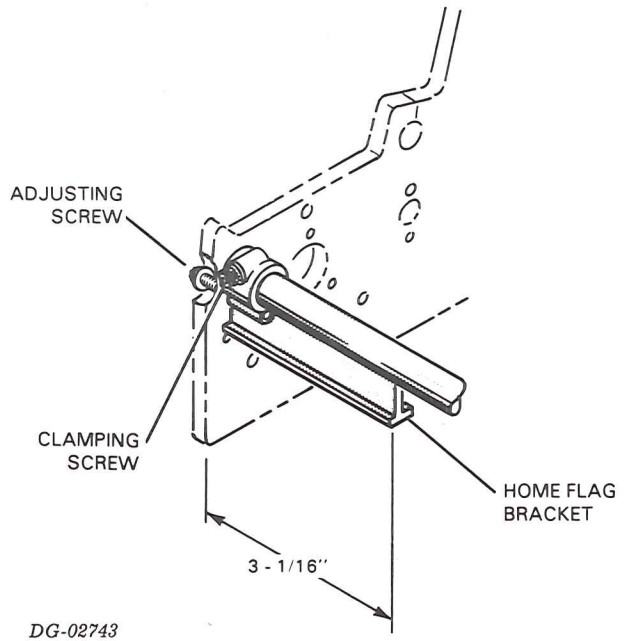
5. Move the printhead to the left margin by manually turning the feed screw. CAREFULLY check that the home flag bracket clears the printhead during this operation. There must be no possibility that the bracket and printhead will collide during carriage returns, or both will be damaged.

6. Roughly set the relative position of the print timing (front) transducer and timing disc as follows:

   a. Type carriage return; the printhead should return to the left margin. Leave the terminal powered up.

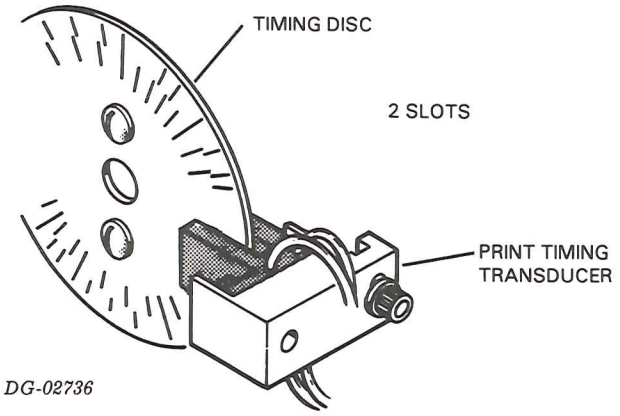
   b. Observe the relationship of the timing disc and front transducer. The transducer should be centered over a group of 5 slots as shown. If not, adjust the home flag position (slightly) by loosening the home flag bracket clamping screw and turning the adjusting screw. Tighten the clamp securely.

   c. Space the printhead away from the left margin and type carriage return. Check that the slots on the timing disc are in the correct position (given above) with respect to the front transducer bracket. Readjust the home flag bracket as necessary to obtain this.



DG-02743

CAUTION *The adjusting screw MUST locate in the counterbored hole in the bracket, or the printhead will hit the bracket.*



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7. Set up the oscilloscope to display the MOTOR PULSE signal, triggering on the rising edge of the signal at TP1. Type a carriage return from the center of the carriage, and observe the time from trigger to MOTOR PULSE. Adjust the home flag bracket **SLIGHTLY** until the time is as shown in the figure. Tighten the bracket clamp securely.

8. Set up the oscilloscope to display the signal from the print timing transducer, triggering on the rising edge of MOTOR PULSE. Observe the scope signal while pressing the space bar. The signal should have the form shown in the figure; if not, adjust the print (front) transducer slightly, type carriage return, and recheck the trace. Repeat until the trace is as shown, but always check the trace starting from the home position.

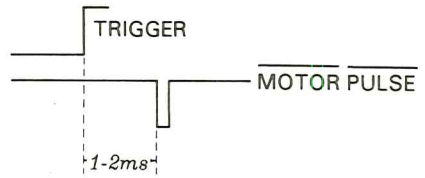
9. Set up the oscilloscope to display the signals from the print timing (front) transducer, triggering on the rising edge of FIRST GAP. These signals are available as noted on the right, for the artwork revisions specified. Type a carriage return, and then type one character. Observe the oscilloscope traces when typing the character; the traces should appear as shown in the figure. This configuration will appear only during the first character typed following a carriage return, because FIRST GAP remains asserted until the next carriage return.

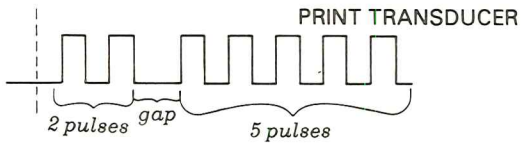
10. If the gap is not correct, move the print timing (front) transducer slightly, and recheck the signals. Loosen the transducer clamping screw using the "L" shaped hex wrench, move the transducer, and tighten the screw before operating the unit and observing the signals. Repeat this cycle until the traces agree with the figure.

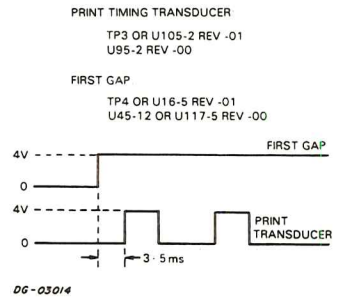
    When the oscilloscope traces are correct, tighten the transducer clamping screw securely and recheck the signals.

11. Type a line of text, a carriage return, and another line of text. The printed characters should be properly spaced, and the registration should be even. If the results are not satisfactory, return to step 1.

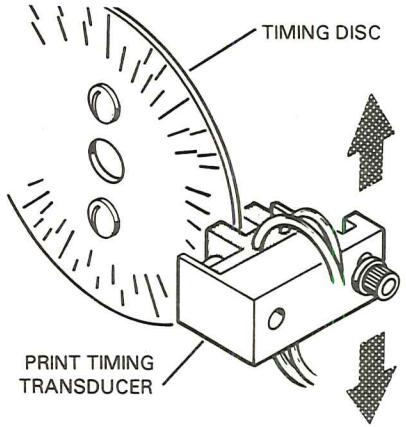
12. Disconnect the oscilloscope and replace the logic board cover.







NOTE *The 3-5 ms gap, between the rising edge of FIRST GAP and the rising edge of the first transducer signal, is the most critical figure.*



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ADJUSTING THE PLATEN POSITION

The position of the platen with respect to the printhead must satisfy two criteria:

1. The space between the print wires and the platen must be 0.015" $\pm$ 0.002" when the platen is set for single part forms.

2. The platen must be parallel to printhead travel.

If the platen/print wire space is too small, the ribbon smudges ink on the paper and the additional friction lengthens carriage return times. If the space is too large, the print is light or nonexistent.

The platen has guide plates on each end, which slide on dowels in the frame endplates. A rod with cams attached passes through both plates; a lever on the end of the rod rotates the cams to move the platen away from or toward the printhead. The lever engages detents corresponding to single-part forms, multi-part forms, and form-change spacing.

Adjustment is performed in two stages: a special adjustment guide is used to set the cams to the correct rotational position for single-part forms, and then the platen is loosened and moved to give the correct platen-to-printhead clearance, as measured with a feeler gauge.

Special Tools Required

Platen Adjustment Guide DGC no. 117-000461
Feeler gauge set

Procedure

1. Turn the power switch off, open the top cover and remove the ribbon and the paper. Leave the platen adjust lever in the rearmost position (platen fully retracted to provide clearance for the next step).

2. Remove the plate which covers the platen adjust lever.

NOTE *Before adjusting the platen position, check that the printhead adjust lever is set to the correct position, as described in the technical manual.*

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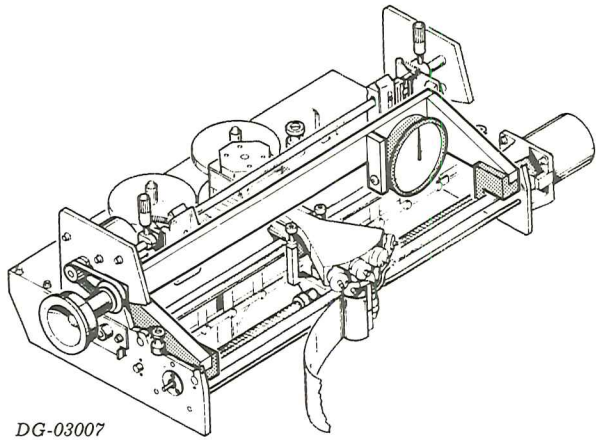
3. Remove the plate which covers the printhead. Place the platen adjustment guide on the carriage guide rails as shown.



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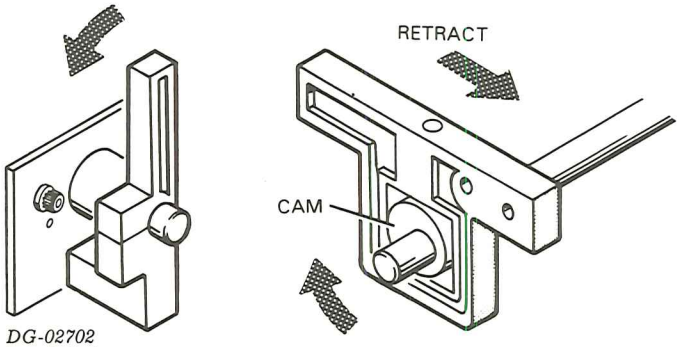
CAUTION *The dial indicator is fragile; handle the guide with care. In particular, the indicator needle may bend on the platen during positioning.*

Move the platen adjust lever to the forward position (platen fully forward -- single-part form -- postion no. 1).



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4. Check that the platen is fully forward and ready to retract by slowly moving the platen adjust lever to the rear. The dial indicator should immediately begin to move counterclockwise. If it does, the platen is fully forward; go to step 5 to adjust the platen spacing. If the indicator hesitates or moves clockwise first, go to the next step to adjust the cam position.

NOTE *The cam has a dead spot in the forward position. The single part detent should position the platen at the end of this dead spot, so that the platen begins to retract as soon as the cam begins to turn. This gives correct spacing for the multi-part detent positions.*

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5. Adjust the platen to the fully forward position as follows:

   a. Loosen the hex head screw on the platen adjust lever and slide the lever to the right until the detent is NOT engaged. Snug down the screw with the lever in this position.

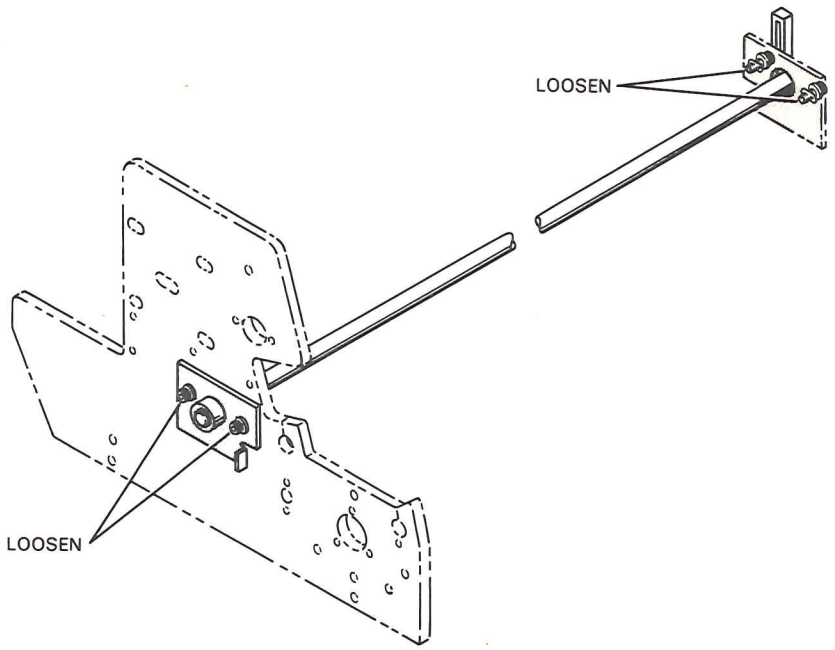
   b. Turn the lever until the dial indicator shows the platen fully forward and ready to retract as soon as the lever is moved to the rear. This is the correct platen position for single-part forms.

   c. Loosen the lever screw and carefully place the lever detent pin in the rearmost detent (single-part position--position 1). Tighten the screw and recheck the platen position as in step 3. Remove the platen guide.

6. Adjust the platen to the correct printhead spacing as follows:

   a. Loosen the 4 socket head screws which secure the platen detent flanges.

NOTE *The shaft must not move when repositioning the lever or the adjustment will be changed.*



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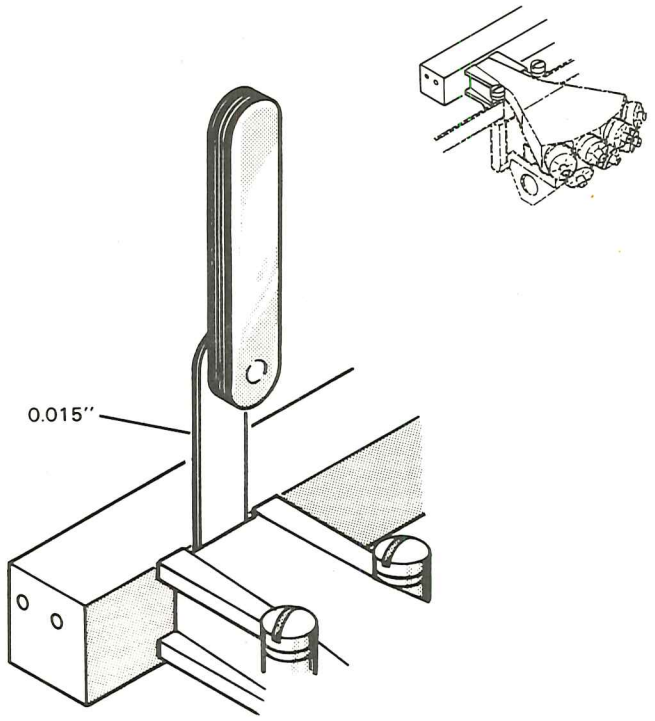
b. Slide the platen so that the clearance between it and the print wires is 0.015" ± 0.002" at both ends of the printhead travel. Set this clearance at one end, and then move the printhead to the other end and set the clearance there. Return to the first setting and recheck the clearance. Use a 0.015" feeler gauge to set the spacing. Be sure that the gauge fits beween the edges of the printhead as shown in the figure.

c. Tighten the 4 screws on the detent flanges and recheck that the platen clearance is correct at both ends of the printhead travel.



DG-02744

7. Replace the cover plate over the platen adjust lever.

8. Replace the cover plate over the printhead.

9. Replace the ribbon, load the terminal with 15" single-part paper, and turn power on. Ensure that the platen adjust lever is at the forward position (position no. 1).

10. Type several full lines of text and check that the print quality is clear and uniform across the paper. Verify that there are no ink smudges on the paper. If the results are not satisfactory, the platen may not be properly adjusted -- return to step 1.

11. Load the terminal with 15" six-part paper, place the platen adjust lever at the vertical (sixth detent) position as shown, and repeat the tests of step 10. Verify that the copies are clear. If the print is light, move the lever to an intermediate position and recheck performance. If ink smudges appear, readjust the platen position--return to step 1.

CAUTION *Move the printhead by manually turning the feed screw. Do NOT push directly on the printhead or carriage.*

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ADJUSTING THE RIBBON TENSION

Ribbon tension is maintained by friction washers on the ribbon spool hubs. If the tension is too small, the ribbon becomes excessively slack following carriage returns. If the tension is too great, the carriage return time is increased due to the additional friction.

Ribbon tension is adjusted by changing the spool hubs' pressure on the friction washer until the torque required to turn the hub is within specified limits. This adjustment is performed after removing the ribbon spools from the unit; the torque is measured with a torque wrench.

Special Tools Required

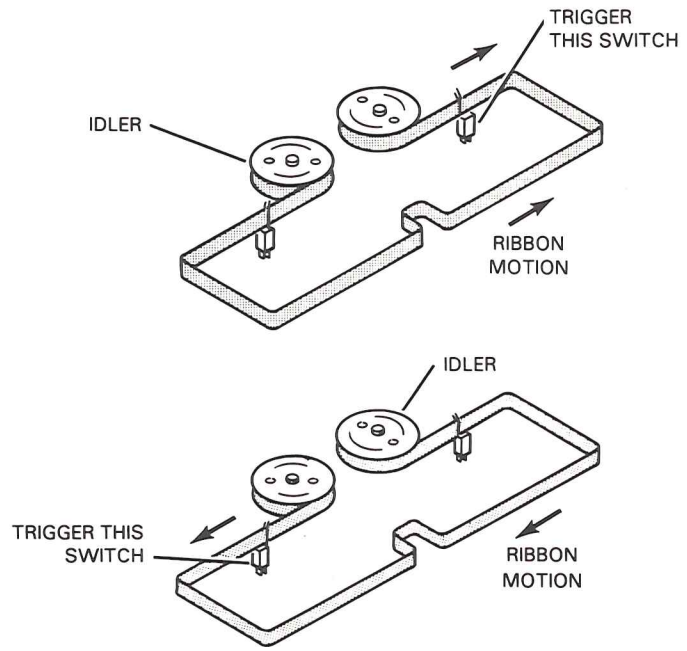
Torque Wrench, calibrated at follows:
Incremental scale ≤ 2 oz. in.
Minimum reading ≤ 2 oz. in.
5/16" socket for torque wrench

Procedure

1. Determine which hub needs to be adjusted. For example,the ribbon may become slack when it is moving in one direction only, and the spool which idles during that ribbon motion requires more tension. Use the ribbon reversing switches to check performance during both ribbon travel directions. The diagram shows driving and idler spools, and reversing switch operations, for both travel directions. Make a note of the results.

2. Turn off the power switch, open the top cover, and remove the ribbon spools from the hubs.

3. Move the ribbon drive swing arm gear train so that the gear is NOT engaged with either hub gear. Reach behind and below the ribbon drive mounting plate to gain access to this gear train.



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4. Use the torque wrench and 5/16" socket to measure the break-away torque of each spool hub, as shown in the figure. Make a note of these values.

5. Compare the results found in step 1 with the recorded torques from step 4. They should qualitatively agree; for instance, for the example given in step 1, the idler spool which was determined to require more tension should have a break-away torque of less than 3 oz.-in.

6. If the torque for either hub requires adjustment, proceed as follows:

   a. Loosen the hub's set-screw slightly, using a 1/16" hex wrench.

   b. Hold the hub from turning and adjust the friction by turning the hub nut. Tightening the nut increases the torque.

   c. Measure the break-away torque using the torque wrench, and turn the hub nut until the desired torque is obtained.

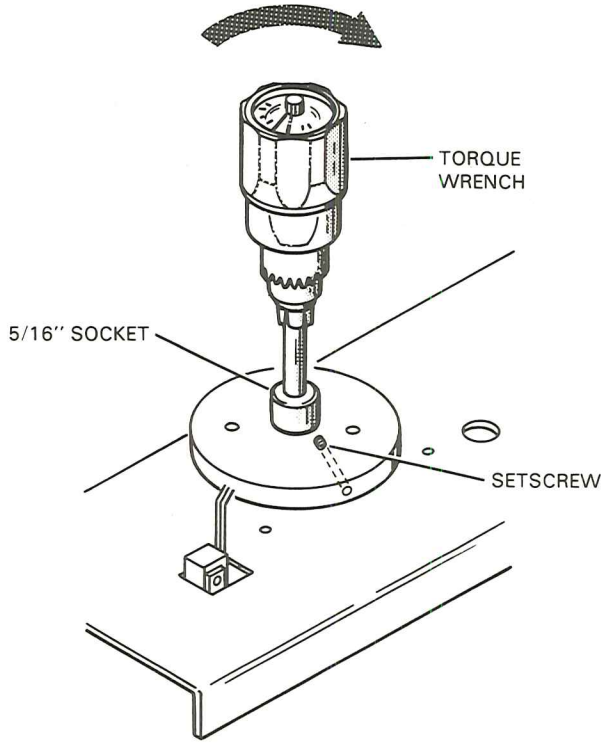
   d. Tighten the set-screw and recheck the hub torque.

7. Replace the ribbon, ensure that the paper is in position and the platen adjusted to the correct spacing position for the form thickness used, and turn on the power switch.

8. Repeat step 1 to check performance; be sure to check performance for both directions of ribbon travel. If the ribbon tension is not satisfactory, note the spool which requires further adjustment, and return to step 2.

9. Close the top cover.

NOTE *The correct torque is 3-5 oz.-in. The exact value varies somewhat, and the final criterion is the unit's performance.*



DG-02740

NOTE *The torque specification given above is somewhat variable. If the comparison indicates that the torque is correct but the performance is unsatisfactory, adjust the hub according to the results of step 1. In such cases, change the torque in 2 oz.-in. increments, following the procedure given below, and recheck performance.*

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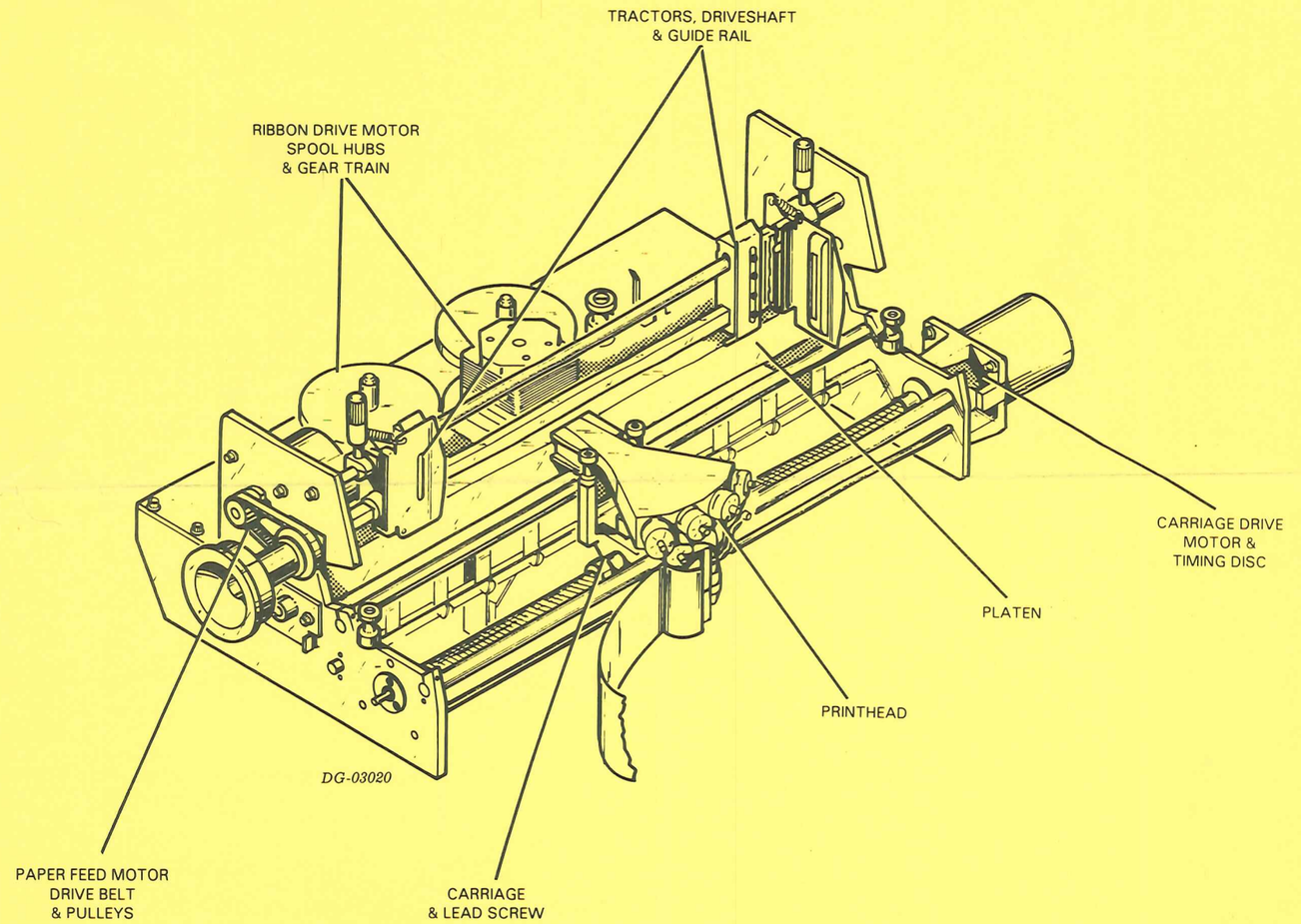
SECTION III
REPLACEMENT PROCEDURES



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PRINTHEAD

The printhead is serviced as an assembly, and no attempt should be made to repair or replace the solenoids or print wires. Return a faulty printhead to the factory for reconditioning. The printhead is removed from the frame by disconnecting its cable, removing the two guide rails, and lifting the printhead from the carriage. The printer mechanism must be lifted from the pedestal to give clearance to remove the guide rails.

The printhead is replaced by reversing the order of operations. After replacement, the timing and home flag transducers must be adjusted, following the procedure given in the "Adjustment Procedures" section of this manual.

Special Tools Required

Dual-Trace Oscilloscope
Six-inch Machinist's Rule (or equivalent)
Torque Wrench, 10 in.-lb. calibration

Procedure

Removal

1. Turn off the power switch, unplug the line cord, and open the top cover.
2. Remove the ribbon from the printhead, and remove the paper. Place the platen adjust lever in the rearmost (fully retracted) position.
3. Move the printhead to the rightmost position.
4. Unplug the ribbon cable from the printhead.
5. Work from below the printer, and remove the four slotted head screws which secure the print mechanism to the pedestal.

CAUTION *Move the printhead by manually turning the lead screw. Do NOT push directly on the printhead or carriage.*

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6. Lift the left side of the mechanism approximately 3 to 4 inches, and support it there with a block.

7. Remove the outer guide rail as follows:

   a. Loosen the home flag bracket clamping screw and slide the bracket about 8 inches to the right.

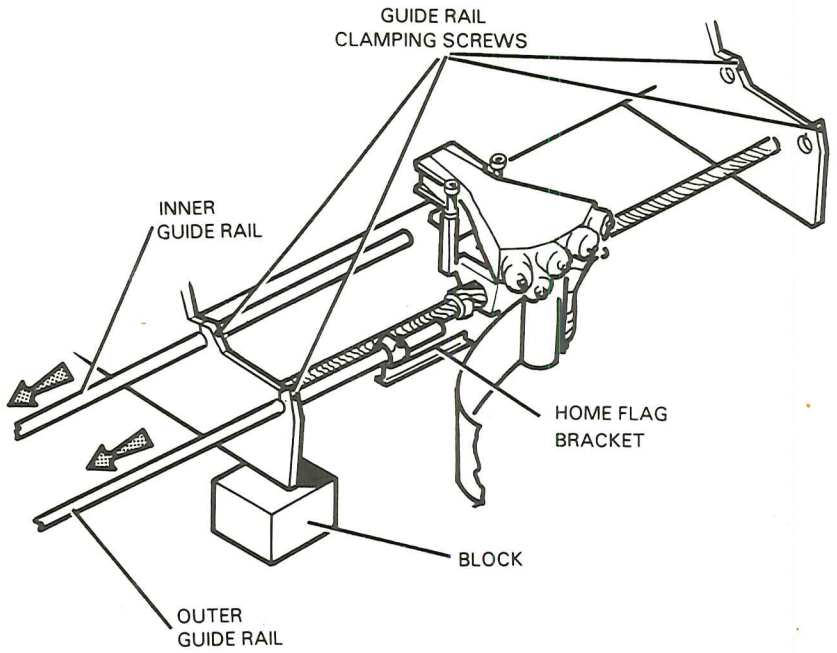
   b. Loosen the two guide rail clamping screws, and slide the guide rail to the left until it is clear of the printhead.

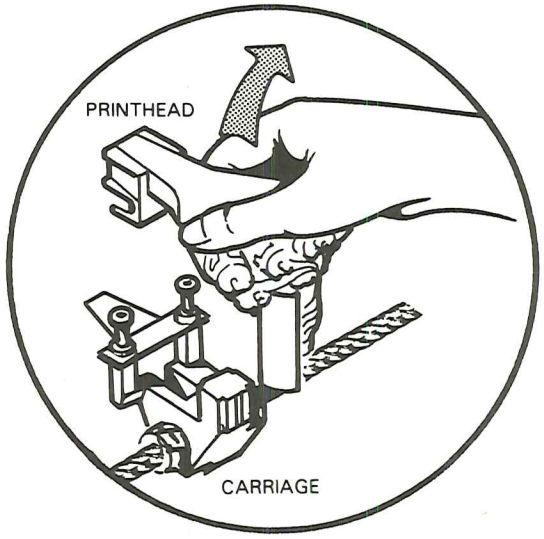
8. Remove the inner guide rail as follows:

   a. Loosen the two guide rail clamping screws, and slide the inner guide rail to the left until it is clear of the printhead.

9. Lift the printhead straight up and off the carriage.

   Remove the two screws holding the head preload spring. Retain the preload spring and its retainer.





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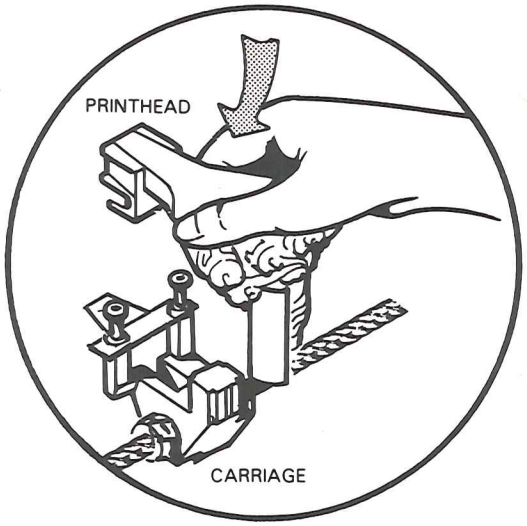
Replacement

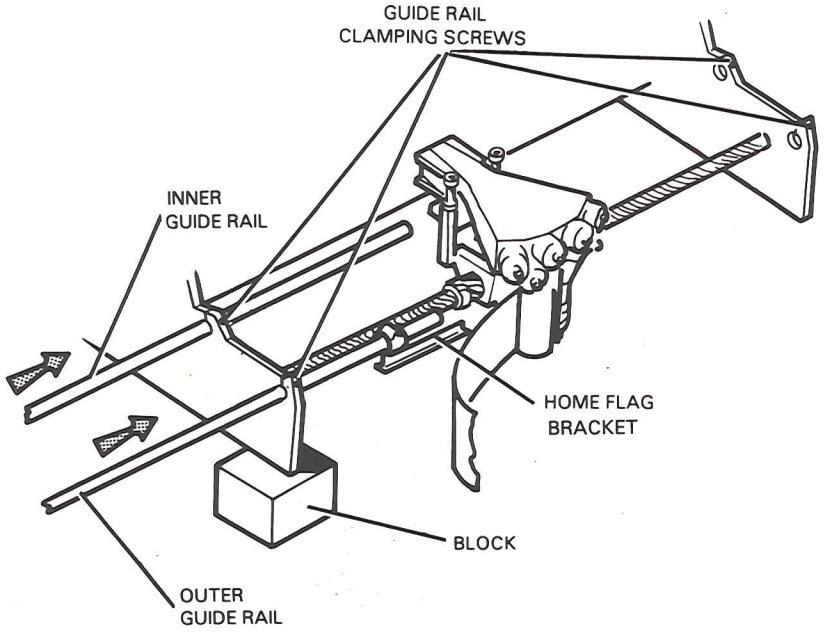
1. Carefully place the printhead in position on the carriage and seat it fully on the carriage. Ensure that all mating surfaces are clean before installing the printhead.

   Be sure the head preload spring and its retainer are fastened in place.

2. Check that the home flag bracket is on the outer guide rail, and slide the outer guide rail through its bushing in the printhead and into place in the frame. The ends of the guide rail should be flush with the outer sides of the frame plates. Tighten the two socket head clamping screws to secure the rail.

3. Slide the inner guide rail through its bearing in the printhead and into place in the frame. The ends of the guide rail should be flush with the outer sides of the frame plates. Tighten the two socket head clamping screws to secure the rail.





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4. Slide the home flag bracket into position at the left-hand side. The adjusting screw MUST seat in the counter-bored hole in the bracket.

   Ensure that the home flag bracket is fully seated on the adjusting screw. This should return the printhead to its previous position at the left margin, and therefore reduce the time required to adjust the timing transducers. Tighten the clamping screw securely.

5. Move the carriage to the left margin by manually turning the feed screw, and check that the home flag bracket clears the carriage.

6. Check that the clearance between the print wires and the platen is 0.015" when the platen is at the single-part position. Perform this check as follows:

   a. Move the platen adjust lever to the forward position.

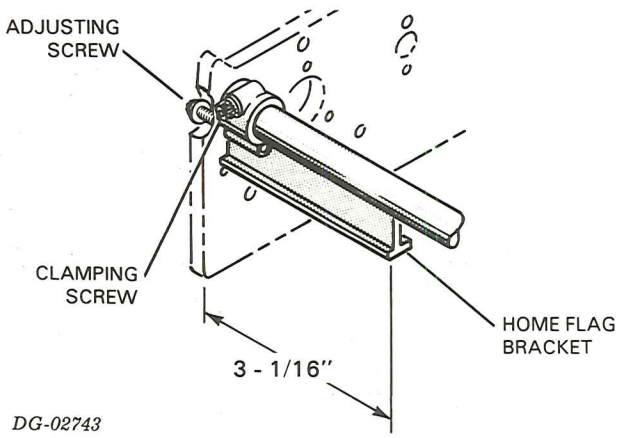
   b. With the printhead at the left margin, measure the clearance between the print wires and platen, using a feeler gauge. The edges of the printhead extend beyond the wires; ensure that the feeler gauge fits between the extended edges as shown in the figure, or a false reading will be obtained.

   c. Move the printhead to the right-hand end of its travel by manually turning the lead screw, and measure the clearance there by repeating step b above. If both clearances measure 0.015", go on to the next step. If either or both clearances are incorrect, the platen is out of adjustment. Adjust the platen position as described in this manual under "Adjustment Procedures".

7. Replace the ribbon and the paper, and move the platen adjust lever to the correct position for the form thickness used.

8. Plug the power cord into the line supply receptacle and turn on the power switch. The printhead will automatically return to the left margin.

9. Adjust the home flag and timing transducers, as described in this manual under "Adjustment Procedures".



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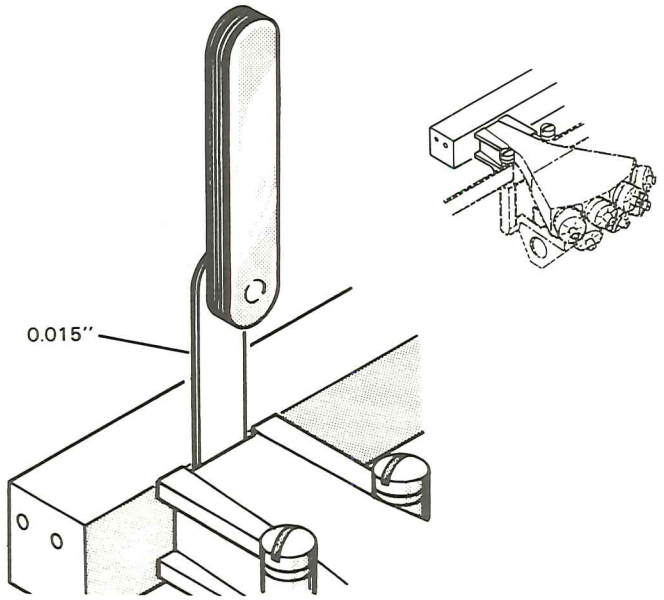
NOTE *The adjusting screw fixes the rotational position of the bracket; if the bracket is rotated from this position, the carriage will collide with it on a carriage return, and serious damage will result.*



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CARRIAGE DRIVE MOTOR AND TIMING DISC

The carriage drive motor and/or the timing disc may be replaced without disturbing the lead screw and/or carriage assembly. Disconnect the lead screw coupling, the motor wires, the timing disc, and remove the motor. The motor bolts directly into place; after replacement, the home flag and timing transducers must be adjusted.

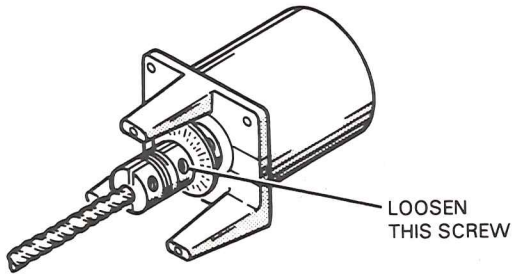
Special Tools Required

"L" shaped hex wrench, 9/64"
Torque Wrench, 10 in.-lb. calibration
Dual Trace Oscilloscope
Six-inch Machinist's Rule (or equivalent)

Procedure

Removal

1. Turn off the power, unplug the power cord, open the top cover, and remove the logic board cover.
2. Unplug the motor cable connector from the logic board. Cut any cable ties securing the cable.
3. Loosen the lead screw coupling clamp screw, as shown in the figure, using a hardened hex wrench.
4. Loosen the timing disc clamping screw, and check that the disc is free to slide on the motor shaft.
5. Remove the four socket head capscrews which secure the motor to its bracket. Use the "L" shaped hex wrench where necessary.
6. Hold the timing disc with one hand, and CAREFULLY withdraw the motor from the frame with the other hand. Remove the disc and set it aside in a safe place.



DG-02745

CAUTION *Support the motor securely when removing the last screw. The fragile timing disc, which is still on the motor shaft, will bend on the timing transducers if the motor drops.*

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Replacement

1. Position the timing disc between the transducers, with the clamp toward the motor as shown. Hold it so that the center hole is in line with the lead screw axis.

2. Hold the timing disc in position and insert the motor through the frame, through the disc, and into the lead screw coupling. Secure the motor with four socket head screws. Be sure to fasten the cable clamp with the lower left screw as shown.

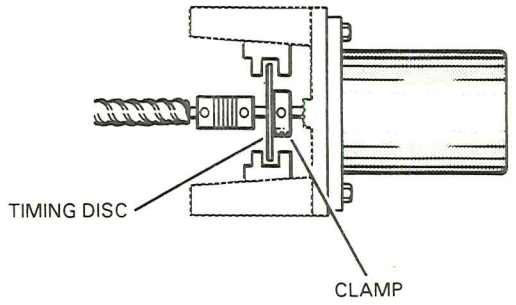
3. Tighten the lead screw coupling clamp screw to 10 in.-lb. torque.

4. Run the motor cable around the bracket and to the logic board. Plug the connector into its position on the logic board, and tie the cable out of the way.

5. Position the timing disc midway between the transducers, and snug down (do not tighten) the clamping screw.

6. Adjust the home flag and timing transducers, following the procedure given in this manual under "Adjustment Procedures".

CAUTION *The disc is fragile and may be easily bent on the transducers. Perform this step and the next one carefully so that the disc does not bend.*



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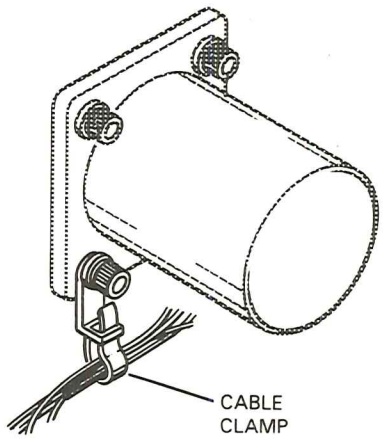

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CARRIAGE AND LEAD SCREW

The carriage and/or the lead screw are removed after removing the printhead, the carriage drive motor, the timing disc, and the lead screw bearing retainers. The lead screw is then free to be withdrawn from the carriage and from the frame.

These components are replaced in the reverse order. After assembly, the platen position and the timing and home flag transducers must be adjusted, as described under "Adjustment Procedures" in this manual.

Special Tools Required

Platen Adjustment Guide, DGC no. 117-000461
Feeler Gauge Set
Dual-trace Oscilloscope
Torque Wrench, 10 in.-lb. calibration
Six-inch Machinist's Rule (or equivalent)
"L" shaped Hex Wrench, 7/64"

Procedure

Removal

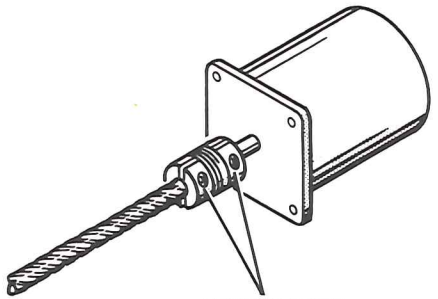
1. Turn the power switch off, unplug the power cable, and remove the ribbon and the paper.

2. Remove the carriage drive motor and timing disc, as described under "Replacement Procedures" in this manual.

3. Remove the printhead, as described under "Replacement Procedures" in this manual.

4. Remove the lead screw coupling from the lead screw after loosening the clamp screw.

5. Remove the three Phillips head screws from the right-hand bearing retainer, and remove the retainer. The motor bracket may be removed for more convenient access to the retainer.



DG-02742

CAUTION *There is a wavy washer and a number of shims inside the bearing housing which is now exposed. DO NOT MISPLACE THE SHIMS AND WASHER. The shims are selected at the factory to provide the correct preload to the bearings, and must be replaced upon reassembly.*

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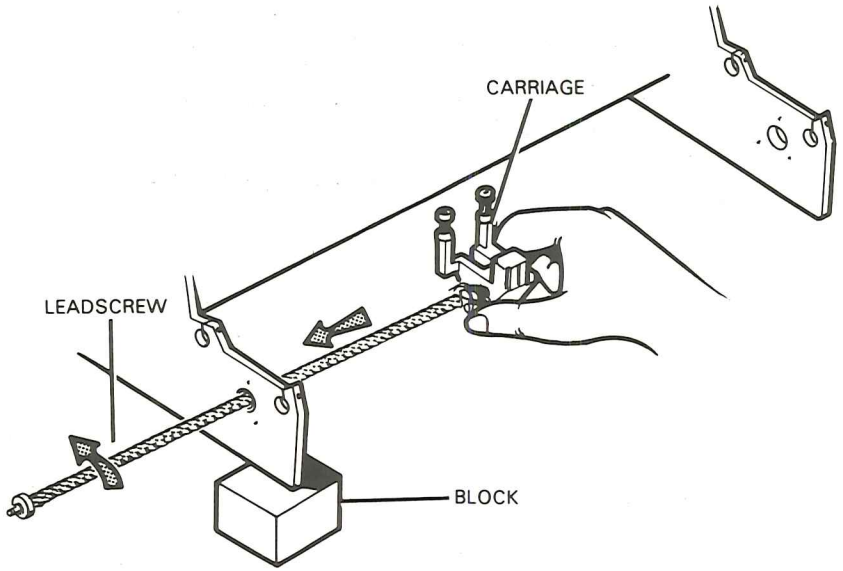
6. Remove the three Phillips head screws from the left-hand bearing retainer, and remove the retainer.

7. Ensure that the left-hand end of the mechanism is still lifted 3 inches from its mount in the pedestal, as it was during printhead removal. Withdraw the lead screw from the left-hand side of the frame. Unscrew the lead screw from the carriage to withdraw it, while holding the carriage to prevent damaging it.



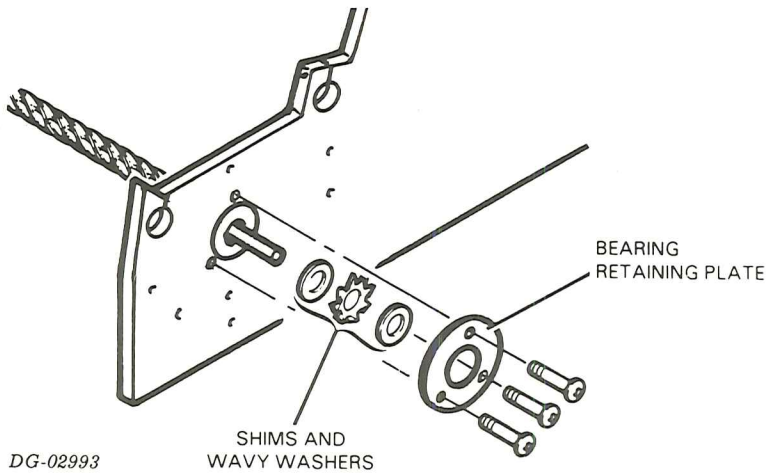
DG-03011

NOTE *Retrieve the wavy washer and shims from the right-hand bearing housing as the lead screw is withdrawn. Set these aside in a safe place.*

8. Retrieve the two rebound springs and the two spring flanges as the lead screw is withdrawn.

9. Remove the two ball bearings. These are a slip fit on the lead screw and in the endplates.

10. Inspect the ball bearings for wear, roughness, and pitting. Replace if necessary.



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Replacement

1. Insert the lead screw into the bearing opening in the left-hand endplate, until it extends into the mechanism about 8 inches.

2. Slide a rebound spring flange and rebound spring onto the lead screw from the inside end of the screw, so that the flanged end is facing the inside of the left-hand endplate.

3. Hold the carriage in position between the endplates, with the split end of the nut away from the carriage drive motor, and thread the lead screw through the carriage nut until it extends past the carriage a few inches. Do not insert the lead screw into the right-hand endplate yet.

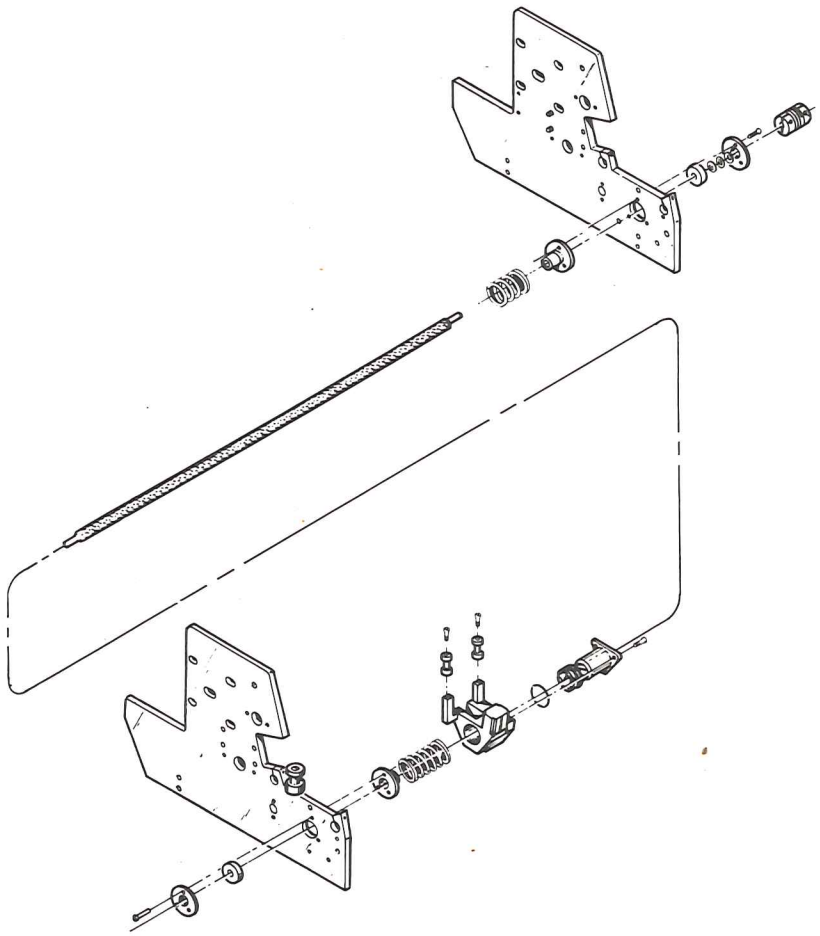
4. Slide a rebound spring and a rebound spring flange onto the lead screw, so that the flanged end is facing the inside of the right-hand endplate.

5. Position the lead screw in the bearing holes in the endplates.

6. Install the ball bearings into the endplates, with the lead screw through the inner races. It is recommended to install the bearings simultaneously, to prevent the lead screw from cocking and jamming on the races.

7. Slide the left-hand bearing retainer into place, slide the left-hand rebound spring flange against the inside of the endplate, and secure these pieces with three Phillips head screws from the outside. Ensure that the shoulder on the lead screw is seated on the bearing.

NOTE *The lead screw is installed into the unit from the left-hand side, with the shanked end toward the right (toward the carriage drive motor).*



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8. Install the shims and wavy washer onto the right-hand end of the lead screw as shown. The shims must be the ones which were removed, or the bearing preload will be incorrect. Ensure that the bearing is seated on the shoulder of the lead screw, assemble the bearing retainer plate onto the screw, and secure it and the rebound spring flange with three Phillips head screws, as was done for the left-hand side. Tighten all screws securely.

9. Replace the support bracket for the carriage drive motor, if the bracket had been removed.

10. Install the printhead, as described under "Adjustment Procedures" in this manual.

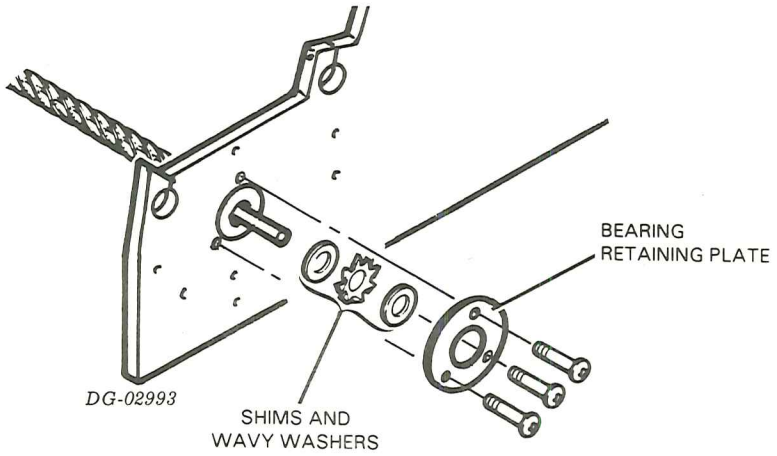
11 Lower the printer mechanism into place in the housing, and secure it to the pedestal with four slotted head screws, inserted from below the bottom cover.

12. Slide the lead screw coupling onto the lead screw.

13. Install the timing disc and carriage drive motor as described under "Replacement Procedures" in this manual.

16. Adjust the platen position as described under "Adjustment Procedures" in this manual.

17. Load the terminal with ribbon and paper, and adjust the timing and home flag transducers as described under "Adjustment Procedures" in this manual.



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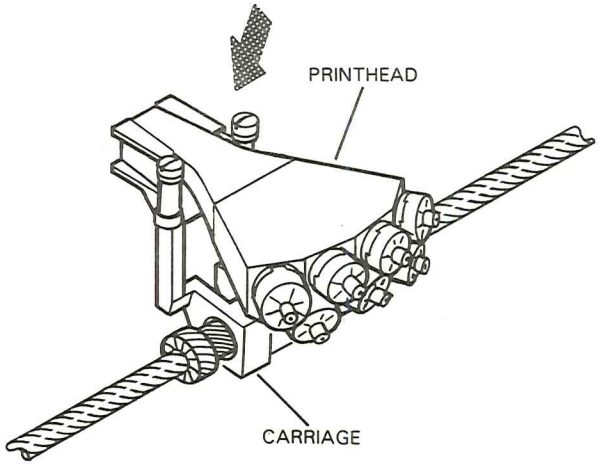

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NOTE *Be sure to tighten the coupling's INNER (left) clamp screw to 10 in.-lb. torque before proceeding further.*

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TRACTORS, DRIVESHAFT, AND GUIDE RAIL

These components are removed and replaced in a straightforward manner, and no adjustments are necessary after replacement. It is important to ensure that the form-feed pins on both tractor assemblies are synchronized; there is an alignment mark on the tractor for this purpose. Note that each tractor is serviced as a unit, and should not be disassembled for repair.

The guidelines given below outline replacement procedures and emphasize areas where care must be excersized. Refer to the mechanical IPL supplied with the unit for the correct order of assembly of the various components.

Special Tools Required

None

Guidelines

Removal

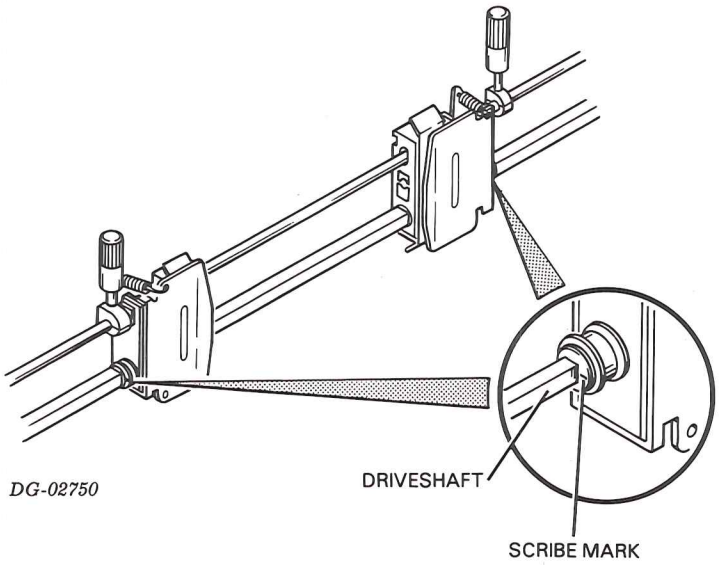
Remove the following parts in the order given:

1. The vernier adjustment knob, drive belt, woodruff key, and driven pulley.
2. The driveshaft bearing retainer plate on the left-hand side.
3. The driveshaft; withdraw it from the left-hand side.
4. The tractor guide rail and tractors.

Replacement

Reverse the order of disassembly to replace the parts. Be sure to adjust the belt tension.

NOTE *Left and right tractors are different- they are not interchangeable.*



DG-02750

NOTE *Each tractor has an alignment mark scribed on the driveshaft bushing. The mark must align with the same flat side of the square driveshaft for both tractors, or the form-feed pins will not be synchronized. The figure shows the correct orientation.*

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PAPER FEED MOTOR, DRIVE BELT, AND PULLEYS

This set of components consists of a stepping motor, a drive belt, two toothed pulleys, and a manual adjustment knob. Replacement of any or all of these components is straightforward. The only adjustment which is necessary is the drive belt tension adjustment.

Special Tools Required

None

Guidelines

Belt Tension

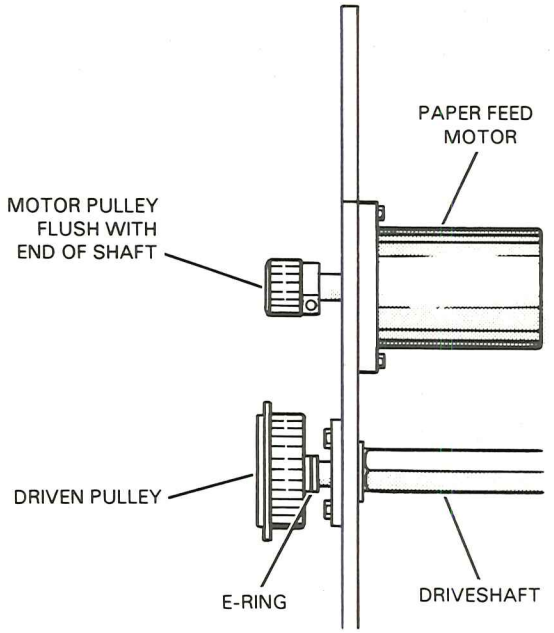
After installing the drive belt, slide the drive motor until the belt deflects approximately 1/4" under finger pressure. Tighten the four socket screws and recheck the deflection.

Pulley Clearances

The figure shows proper clearances for both pulleys. The motor pulley should be flush with the end of the motor shaft, and the clamp should be up against the inner side of the pulley. The driven pulley seats on an E-ring on the tractor driveshaft.

Motor Wires

Tie the wires clear of all moving parts.



DG-02749

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RIBBON DRIVE MOTOR, SPOOL HUBS, AND GEAR TRAIN

Any or all of these components are serviced after removing the ribbon drive mounting plate from the frame. Replacement is straightforward; after reassembing the components onto the plate, the hub friction must be adjusted.

Special Tools Required

Torque Wrench, calibrated as follows:
Incremental scale ≤ 2 oz. in.
Minimum reading ≤ 2 oz. in.
Hex wrench, 1/16" (hub setscrew)

Guidelines

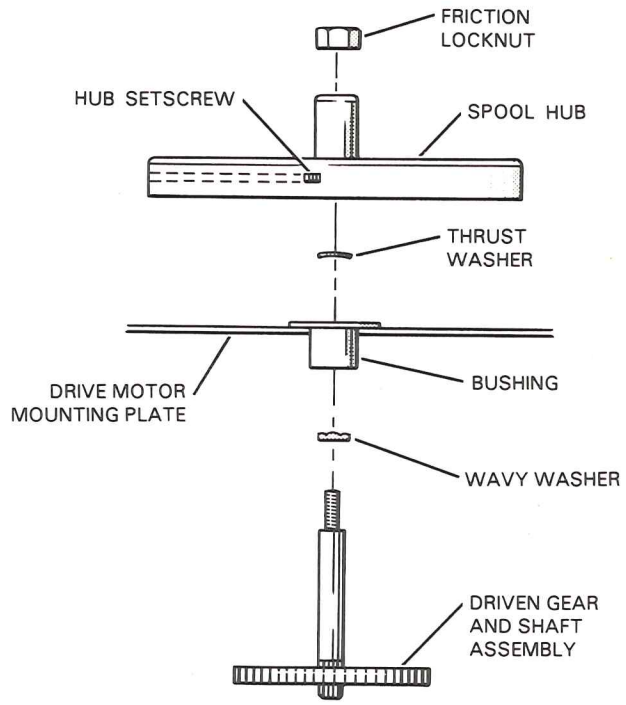
Turn off power to the terminal and unplug the power cable. Open the top cover and remove the ribbon, unplug the ribbon drive motor cable from the power supply, and remove the ribbon drive mounting plate (four screws).

An exploded view of the spool hub is shown in the figure. The brass bushing is part of the mounting plate. Note the thrust washer between the bushing and the hub. The friction locknut provides axial thrust to the wavy washer, which in turn provides rotational friction to the hub; the hub setscrew locates on a flat on the shaft, and provides rotational motion to the hub. If any components of the spool hubs are disturbed, the hub friction must be adjusted to provide correct ribbon tension. Follow the procedure given in this manual under "Adjustment Procedures".

The pivoting gear set is serviced as an assembly, and is fastened to a flat on the motor shaft with a setscrew. Note the extension spring on the assembly; this is critical to the auto-reversing of ribbon motion, and must be in place. It is necessary to remove the guide block before removing the pivoting gear train.

All gears are installed with the hubs downward.

The drive motor needs no adjustment when it is replaced.



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TRANSDUCERS AND SWITCHES

All transducers and switches are replaced in a straightforward manner. Some require adjustment after they are replaced, and the guidelines below indicate which require adjustments, as well as the general procedure used to replace them.

Special Tools Required

(transducer replacement only)
Dual Trace Oscilloscope
Six-inch Machinist's Rule (or equivalent)
Torque Wrench, 10 in.-lb. calibration

Guidelines

Timing Transducers (Print Timing and/or Return Timing)

Unplug the transducer cable from the logic board and remove the transducer. After replacement, adjust the timing and home flag transducers, following the procedure given in this manual under "Adjustment Procedures".

Home Flag Transducer

Remove the printhead from the terminal, following the procedure given under "Replacement Procedures" in this manual. Unsolder the wires from the transducer, replace it, reconnect the wires, and install the printhead. After the printhead is replaced, adjust the timing and home flag transducers, following the procedure given in this manual under "Adjustment Procedures".

Carriage Right Switch

Unsolder the wires from the switch, replace the switch, and reconnect the wires. After replacement, check that the switch closes at the correct printhead position by turning on the terminal and spacing the printhead out from the left margin. The "carriage right" tone should sound at character position 126 ($\pm$ 4). If the tone sounds at some place other than this, bend the switch lever until the position is satisfactory.

Out of Forms Switch

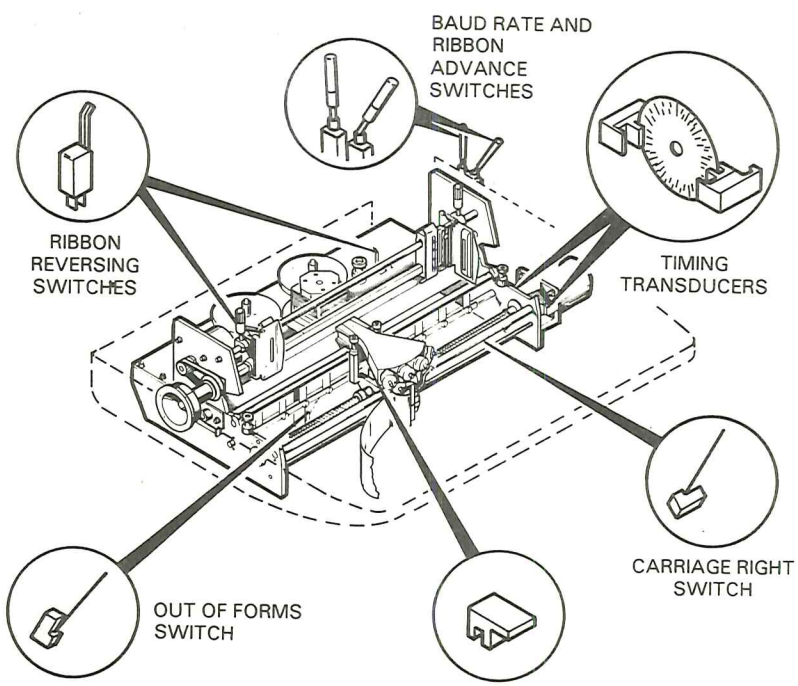
Remove the paper, unsolder the wires from the switch, replace the switch, and reconnect the wires. Check that the switch triggers the PAPER FAULT indicator light when there is no paper in the terminal, and that the light goes out when paper is inserted. Bend the switch lever if necessary.

BAUD RATE and RIBBON ADVANCE Switches

Unsolder these switches from the logic board and replace.

Ribbon Reversing Switches

The ribbon drive mounting plate must be removed to replace these switches. Remove the ribbon from the terminal, remove the mounting plate (four screws), and unsolder the wires. Replace the switch, reconnect the wires, and reassemble the terminal.



DG-03001

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PLATEN

The platen is removed by withdrawing the adjustment shaft, after disconnecting the adjustment cams and the upper dowels which support the platen. The paper feed drive motor must be removed for clearance. The platen is replaced by reversing this procedure, and then adjusting the sliding friction using the supporting dowels. After replacement, the clearance between the platen and printhead must be adjusted.

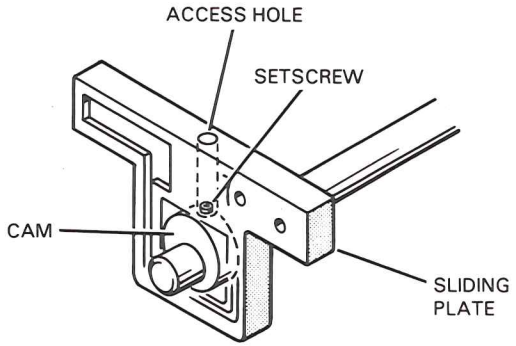
Special Tools Required

Platen Adjusting Guide, DGC no. 117-000461

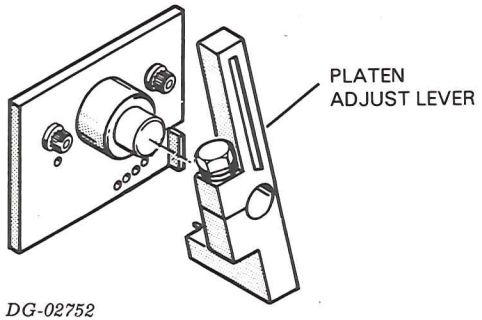
Procedure

Removal

1. Turn off the power to the terminal, open the top cover and remove the paper and the ribbon.
2. Remove the paper feed drive motor.
3. Use the platen adjust lever to rotate the shaft until the cams' set-screws are visible through the access hole in the sliding plates, as shown.
4. Loosen the set-screws. There is a flat on the shaft, so the set-screws must be loosened sufficiently to clear the shaft. Do not remove the set-screws from the cams.
5. Remove the platen adjust lever by loosening its clamping screw and pulling it off the shaft.
6. Withdraw the shaft from the right-hand side. The two adjusting cams will be free as the shaft is withdrawn, and they must be removed from the sliding plates.
7. Slide the platen forward and back manually, to get a feel for the sliding friction required when the platen is replaced. The fit is snug but not tight; there should be no vertical play, but neither should the platen bind on the locating dowels.



DG-02751



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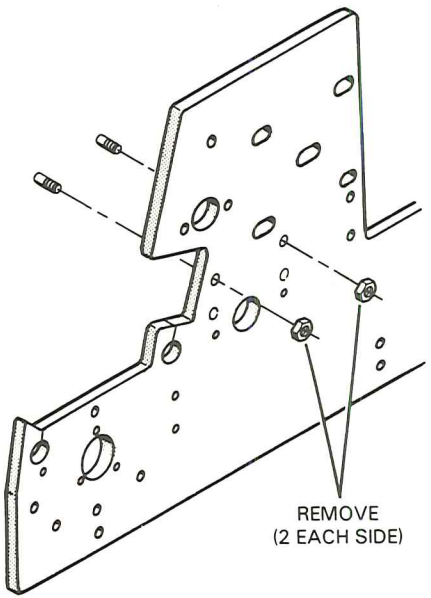
8. Remove the four locknuts from the upper locating dowels, as shown in the figure.

9. Remove the four upper locating dowels.

10. Remove the platen from the frame, by lifting it up and back. Be careful that it does not bind on the frame.



DG-02753

NOTE *The guide plates are part of the platen assembly and should NOT be removed from the platen. A special assembly fixture must be used to assemble the plates to the platen, to ensure proper alignment of the parts. The platen is serviced as an assembly.*

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Replacement

1. Carefully slide the platen into position in the frame. Seat the guide plates on the lower locating dowels.

2. Install the four upper locating dowels, and loosely install the four locknuts.

3. The locating dowels are cam-shaped; turn each until it is snug against the guide plates. Ensure that the plates are seated on the lower dowels, and adjust the four upper dowels until the fit is snug but not tight. Slide the platen forward and backward to check the fit. All dowels should be equally snug.

4. Use a screwdriver to keep the dowels from turning, and tighten the four locknuts. Recheck the platen fit by sliding the platen forward and back.

5. Place the adjusting cams in their positions in the guide plates. Orient the set-screws upward, in line with the access hole in the plates.

6. Slide the platen shaft into the frame from the right-hand side. Orient the shaft so that the flats are up, to correspond with the set-screws in the adjusting cams. Hold each cam as the shaft passes through it, to retain it in its position in the guide plates.

7. When the flats on the shaft are aligned with the cams' set-screws, tighten the set-screws securely.

8. Install the platen adjust lever on the shaft, and check that the platen slides easily and does not bind when rotating the lever. If the platen is too loose or too tight, readjust the upper locating dowels.

9. Replace the paper feed drive motor, and adjust the drive belt tension.

10. Adjust the platen position, following the procedure given in this manual under "Adjustment Procedures".

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POWER SUPPLY AND LOGIC BOARD

The power supply and the logic board are removed and replaced through access panels on the sides of the pedestal. Removal and replacement are straightforward procedures. Important waveforms and their locations on these components are illustrated in Appendix B in this manual.

Special Tools Required

None

Guidelines

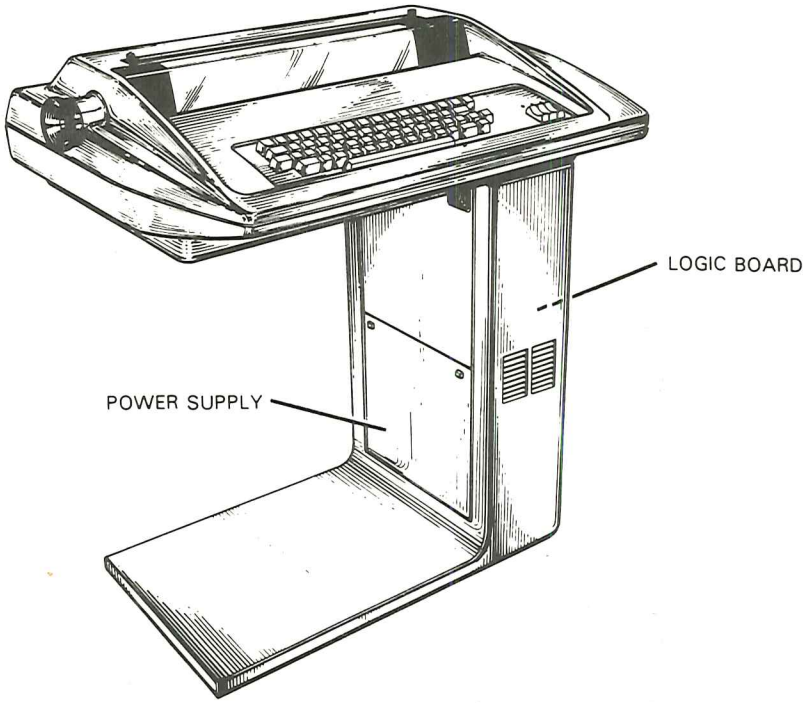
Power Supply

The power supply is removed through the access panel on the inside of the pedestal leg.

Label all plugs before removing them.

Logic Board

The logic board is removed through the access panel on the outside of the pedestal leg. Label all plugs before removing them.



DG-03016

CAUTION *Be sure that the power cord is unplugged from the line outlet before attempting to service the power supply. The line filters and fuses are powered even when the power switch is turned off.*

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KEYBOARD AND OPERATOR'S CONTROL PANEL

The keyboard and the operator's control panel are easily removed and replaced from the terminal. The keyboard, with the exception of the keytops, is serviced as a unit. Individual components on the control panel may be replaced as required.

Special Tools Required

None

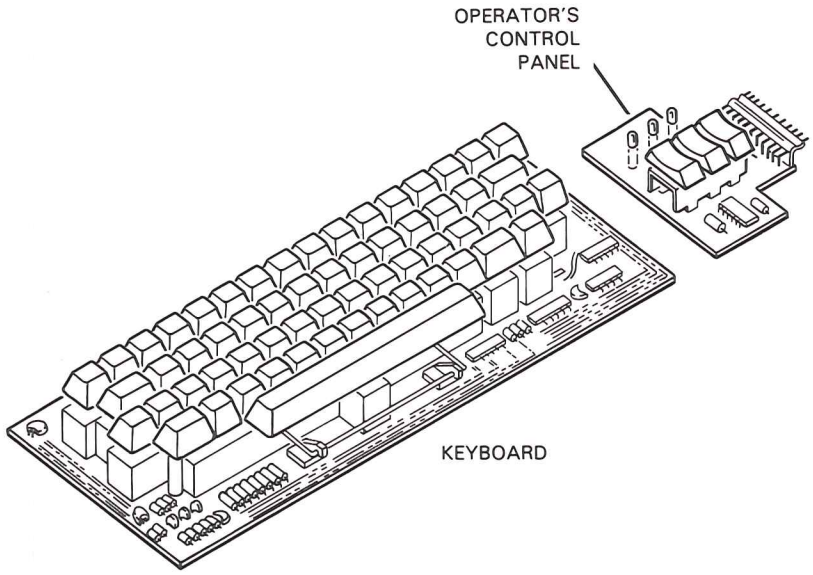
Guidelines

Keyboard (Models 6040, 6042)

Replace a keytop by prying off the old one and snapping the new one in place. Remove the keyboard by unplugging the edge connector and removing six screws.

Operator's Control Panel

Remove four screws, lift up the panel, unplug the connectors, and remove the panel. Label all connectors before removing them.



DG-03004
DG-02692

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APPENDIX A
ELECTROMECHANICAL SPECIFICATIONS

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This appendix summarizes electromechanical specifications necessary to adjust and repair the terminal, and serves as a quick reference for the repairperson. Specifications are grouped under subassembly headings, for convenience when repairing a particular subassembly. Overall performance specifications are tabulated in the technical manual for the terminal.

Paper Feed Drive

Belt tension: 1/4" deflection under finger pressure.
Tractor synchronization: scribed mark on each tractor aligned with same flat on driveshaft.

Ribbon Drive

Ribbon Spool Hub: 2-4 oz. in. breakaway torque.

Carriage Drive

Feed screw coupling clamp screw: 10 in.-lb. torque.
Timing disc clamp screw: 10 in.-lb. torque

Platen

Platen-to-print wire clearance: 0.015" $\pm$ 0.002" (single-part forms)

Six position platen adjust lever used to set desired print quality for multi-part forms as follows:
Position 1: single-part forms
Positions 2-6: multi-part forms

Printhead

Solenoid coil dc resistance: 7.3 ohms + 5%

Home Flag Bracket

Right end of bracket to inside of frame: 3 - 1/16"

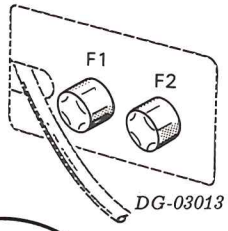
Engineering Drawings

016-000380 Mechanical IPL
016-000379 Interconnection Diagram
016-000338 Electrical IPL, Power Supply
016-000609 Electrical IPL, Logic Board
001-000963 30 cps Serial Printer, Schematic
001-000964 Power Supply, Schematic

Fuses

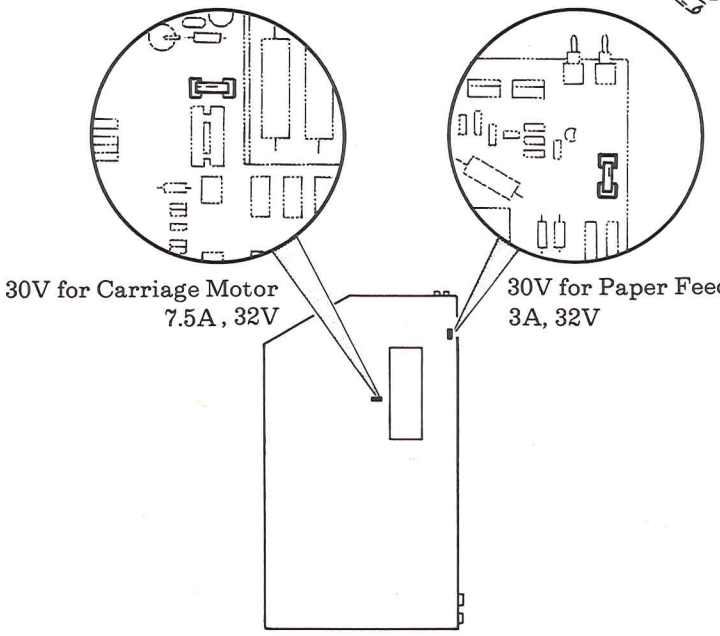
Line Fuses

			DGC P/N
220/240Vac	2A	2A	113-41
100/120Vac	4A	OPEN	113-115
	(F1)	(F2)	



DG-03013

30Vdc Fuses



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APPENDIX B
WAVEFORMS

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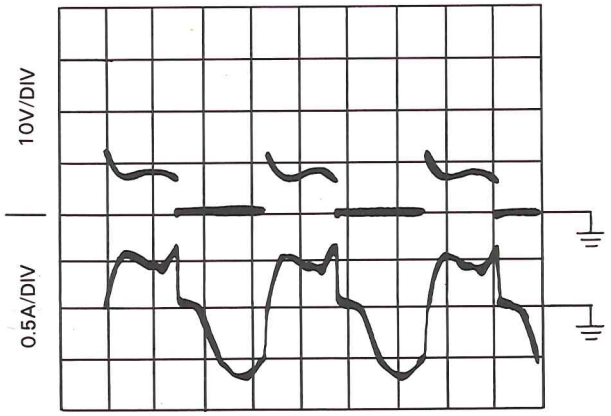
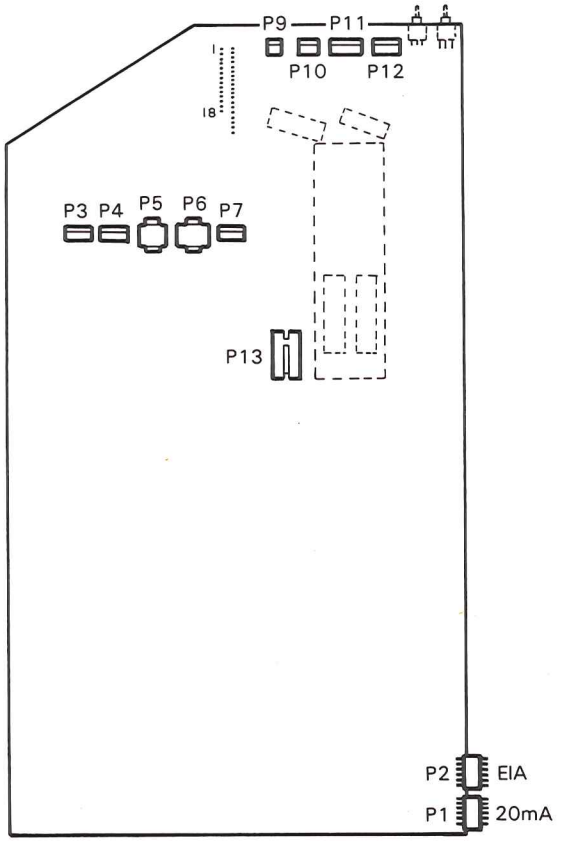
LOGIC BOARD MODELS 6042, 6043

SCHEMATIC: 001-000963-00
IPL: 003-000609-01
ARTWORK: 107-000609-01

This appendix contains a collection of important analog waveforms found on the logic board and on the power supply. These signals are available at the locations indicated, for the specified revision level of the artwork. Before using these waveforms as a troubleshooting guide, be sure that the revision level of the particular unit agrees with the level specified for the waveforms. Consult the documentation included with the unit; the last two digits of a Data General 11-digit part number specify the revision level of that component or drawing.

SIGNALS AT PINS P12-3, P12-1
DURING CONTINUOUS FEED OPERATION





DG-03015

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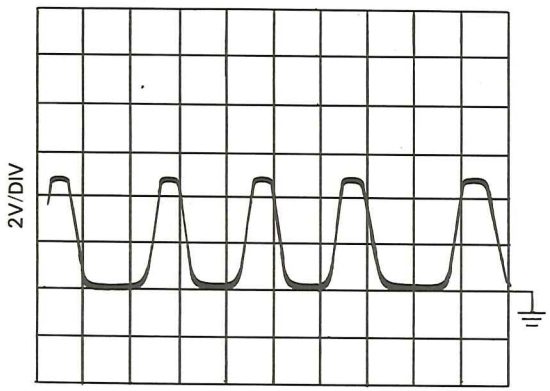
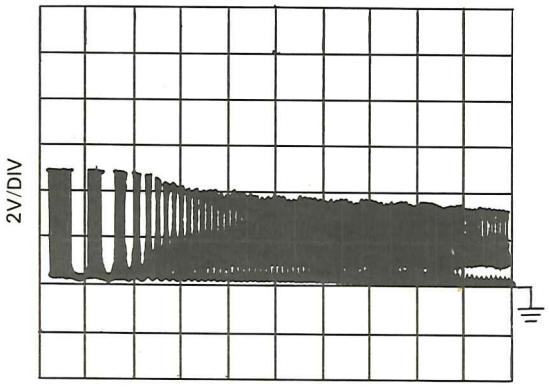
TRANSDUCER VOLTAGE SIGNALS AT PIN P4-3

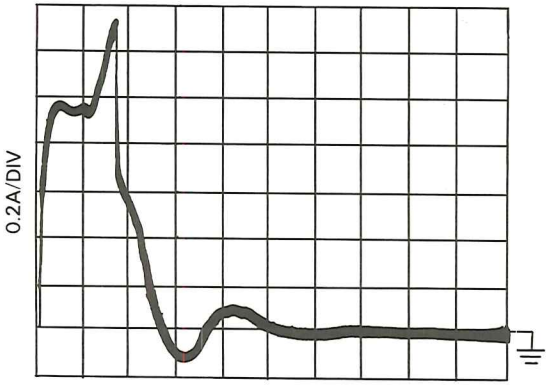
PRINTING ONE CHARACTER

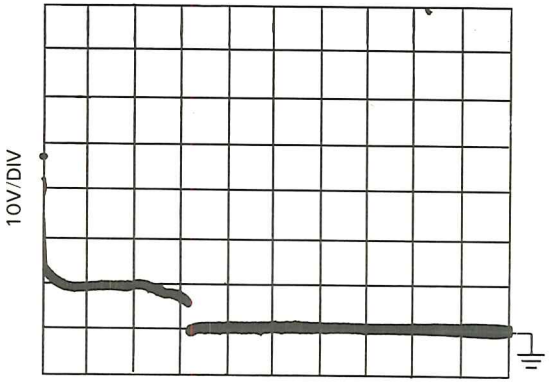


CARRIAGE RETURN

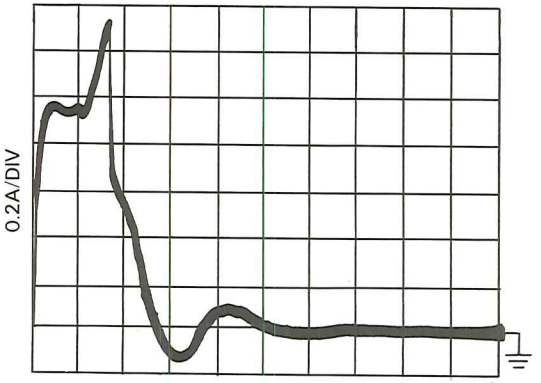


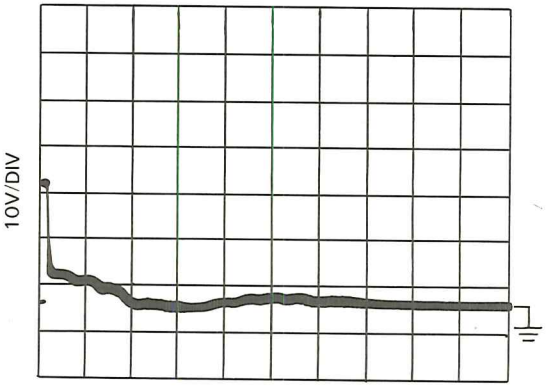
SIGNALS AT PINS P12-3, P12-1 DURING SINGLE LINE FEED OPERATION





SIGNALS AT PINS P12-4, P12-2 DURING SINGLE FEED OPERATION





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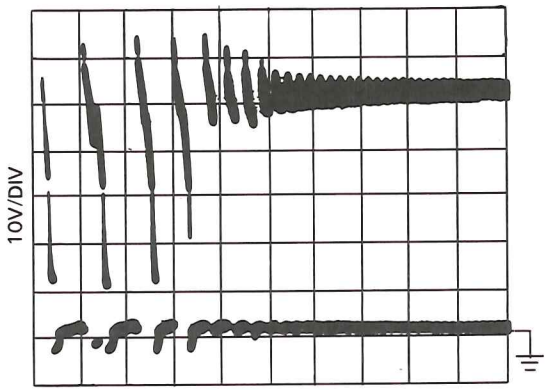
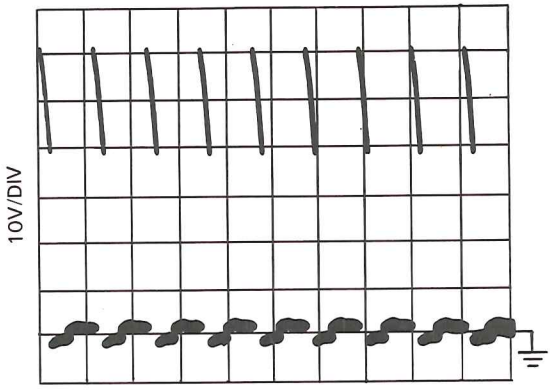
VOLTAGE AND CURRENT SIGNALS TO CARRIAGE RETURN MOTOR AT PINS P11-1, P11-2, P11-3, P11-4, SIGNALS SHOWN FOR VARIOUS CONDITIONS OF CARRIAGE TRAVEL

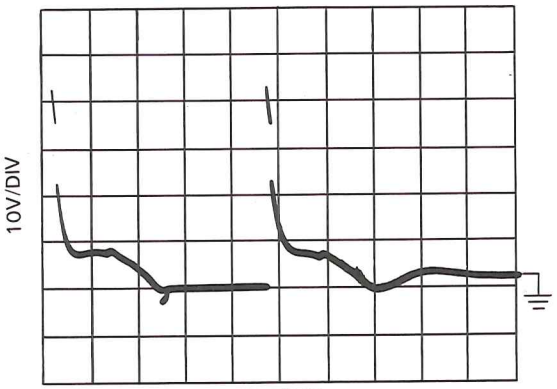
START OF CARRIAGE RETURN

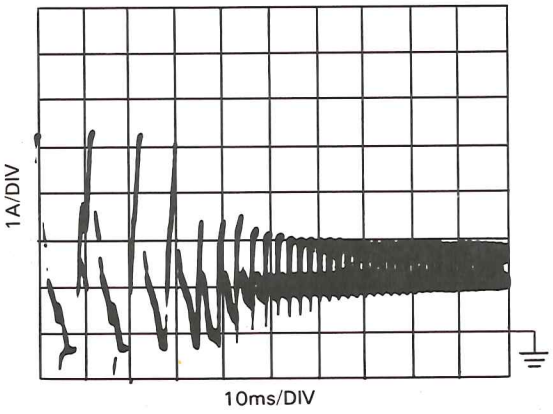


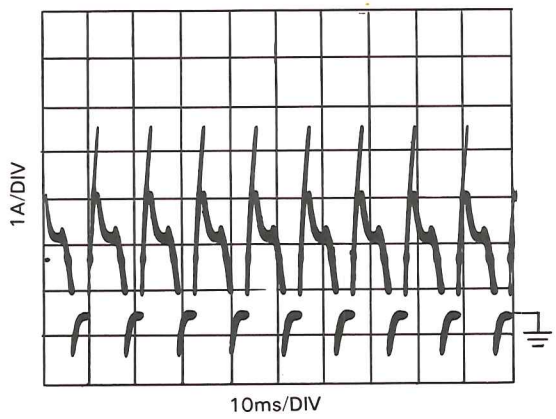
60 cps FORWARD
(CATCH-UP MODE)

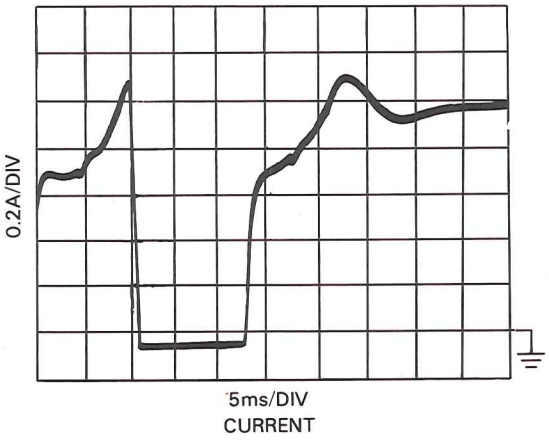


PRINTING ONE CHARACTER









NOTE: Use dc current probe for current signals

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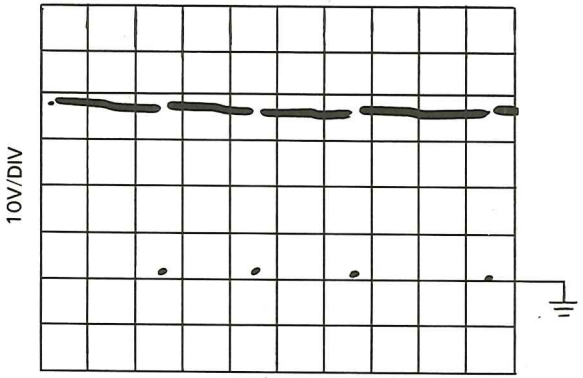
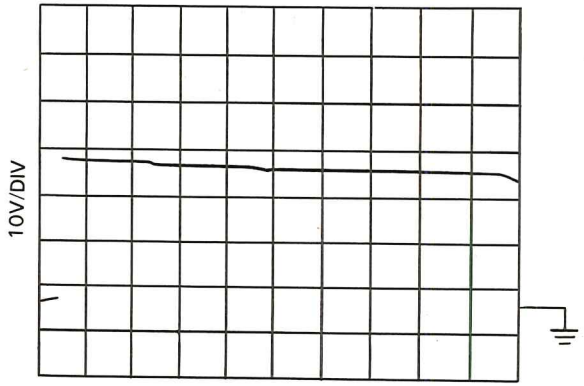
VOLTAGE AND CURRENT SIGNALS TO PRINTHEAD SOLENOIDS, AVAILABLE AT PINS OF PLUG P08. SIGNALS FOR PIN P08-2 ARE SHOWN.

SIGNALS AT PIN P08-2
(TOP WIRE IN PRINTHEAD)
DURING THE PRINTING OF THE LETTER "T"

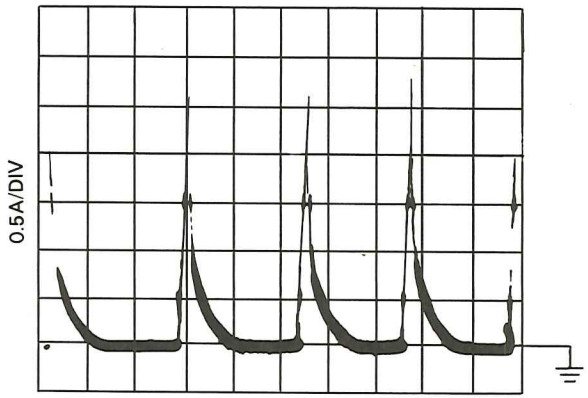


2ms/DIV
VOLTAGE

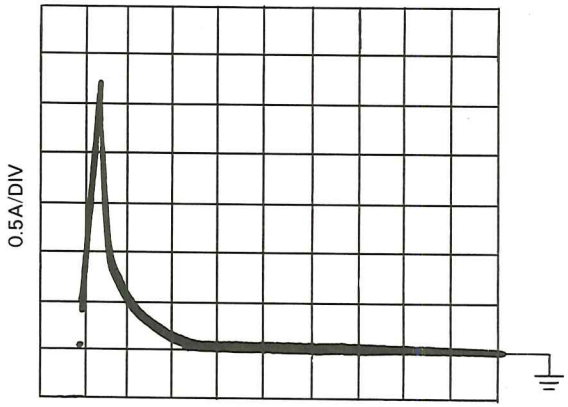
SIGNALS AT PIN P08-2
(TOP WIRE IN PRINTHEAD)
DURING PRINTING OF THE LETTER "A"



1ms/DIV
VOLTAGE



2ms/DIV
CURRENT



1ms/DIV
CURRENT

Correspondence between the pins of P08 and the physical positions of the printhead wires are as follows:
(wires numbered top to bottom beginning with 1).

PIN	P08-2	P08-10	P08-4	P08-12	P08-6	P08-14	P08-8
PRINTHEAD WIRE	1	2	3	4	5	6	7

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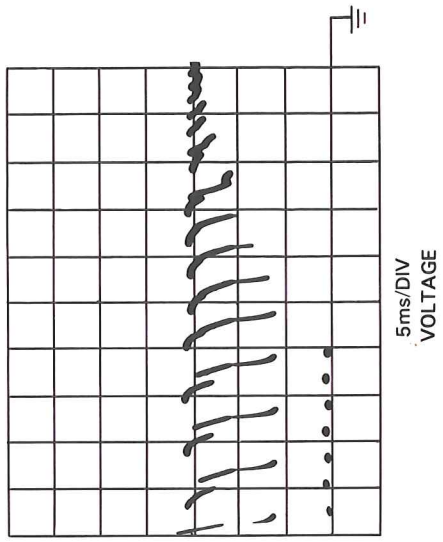
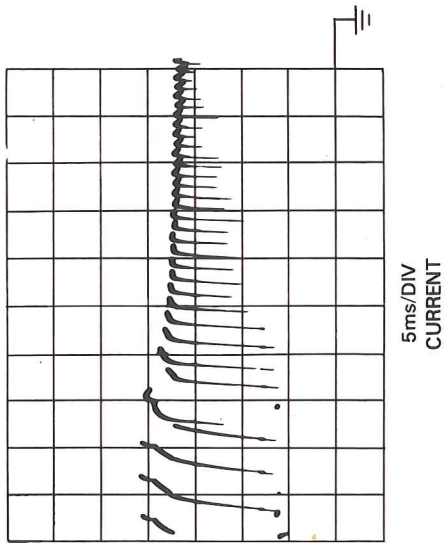
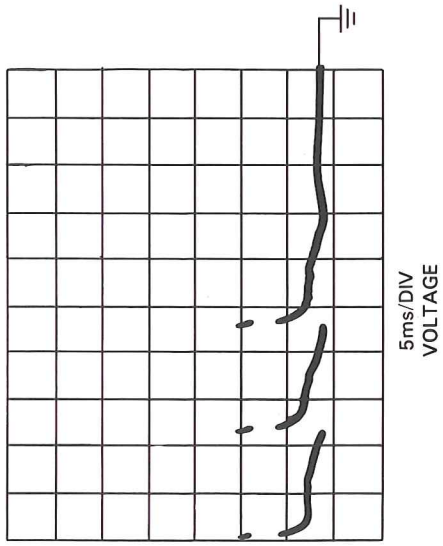
VOLTAGE SIGNALS TO CARRIAGE RETURN MOTOR AT PINS P11-5 AND P11-6.

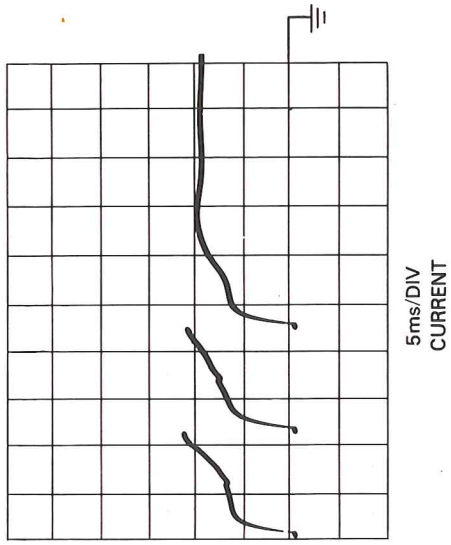
START OF LONG CARRIAGE RETURN
(MORE THAN 8 CHARACTERS)





PRINTING ONE CHARACTER

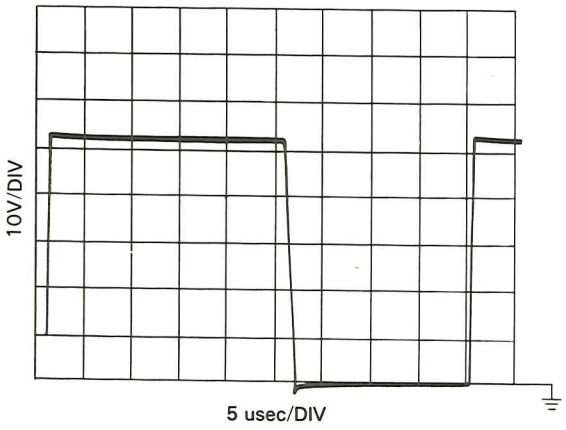




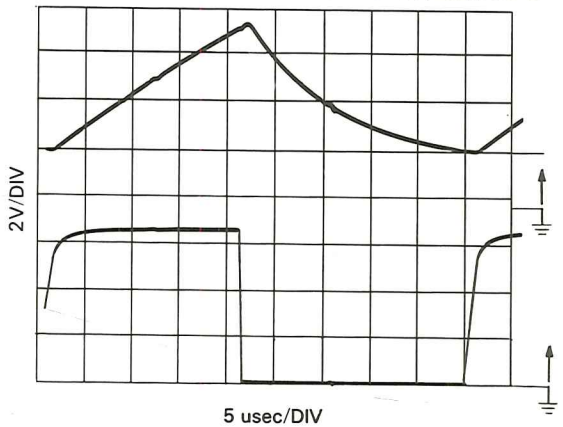
POWER SUPPLY MODELS 6042, 6043

SCHEMATIC: 001-000964-00
IPL: 016-000338-00
ARTWORK: 107-000614-01

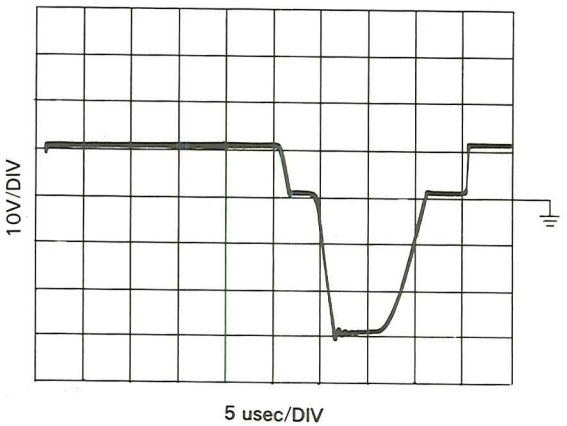
MAIN SWITCH VOLTAGE
COLLECTOR OF Q2 OR Q3



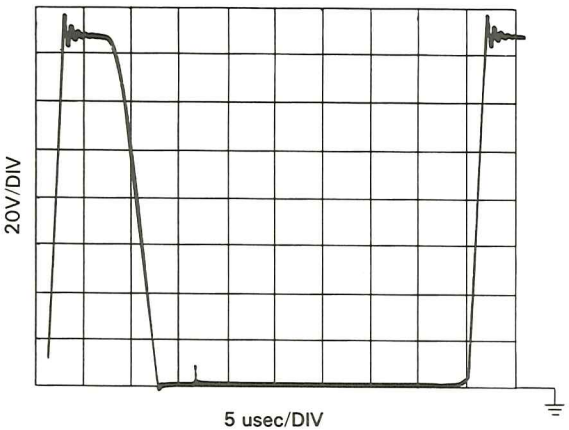
TOP TRACE: TRIANGULAR REFERENC E U2, PIN 8
FOR REGULTOR INPUT
BOTTOM TRACE: OSCILLATOR INPUT, U2, PIN 2



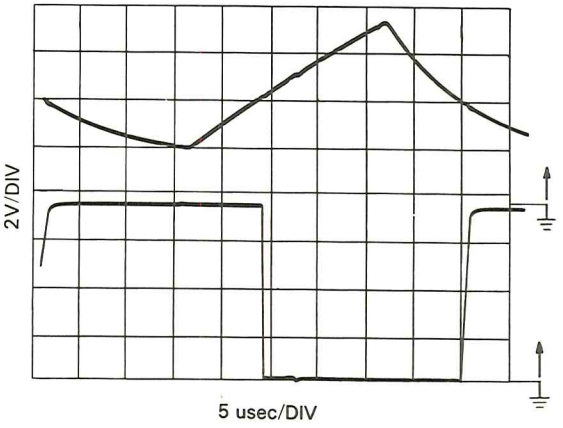
+5V OUTPUT OF 20KHZ TRANSFORMER
ANODE OF CR 14



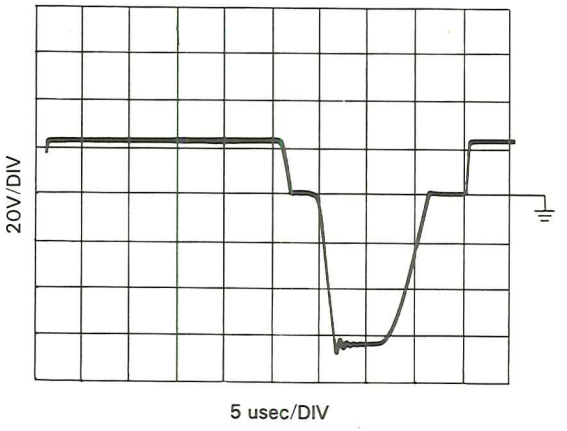
AUXILIARY SWITCH VOLTAGE
COLLECTOR OF Q9



TOP TRACE: TRIANGULAR REFERENCE FOR
U2, PIN 8 REGULATOR INPUT
BOTTOM TRACE: PULSE WIDTH MODULATED
OUTPUT, U2, PIN 14



+12V OUTPUT OF 20 KHZ TRANSFORMER
ANODE OF CR11



NOTE: Waveforms shown correspond to data terminal powered up but idle.

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